Development of a Performance Measurement Model for Facilities Management Industry in the UAE

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Submitted for the degree of Doctor of Philosophy

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July, 2018

ABSTRACT

Facilities management (FM) is a service delivery based industry that contributes added value to organisations. Like other industries, FM organisations are under a constant pressure from shareholders to reduce cost, increase productivity and enhance customer experience. Many frameworks, models and tools have been developed to address the recent advancements in performance measurement (PM). Nevertheless; there is still a gap in the scope of PM in FM, especially in the United Arab Emirates (UAE), where there is a lack of an appropriate set of performance measures to be used by FM practitioners.

This research aimed to develop a comprehensive model that proposes appropriate FM performance measures which can be used by FM organisations in UAE. This was achieved by conducting a literature review to investigate current issues in performance measurement and management and analyse the gaps in the UAE market through semi structured interviews; then theoretically develop the PM model that can enhance performance management within the FM industry by leveraging on the literature review and case studies findings. This model was modified based on a facilities management experts' focus group workshop conducted, then a questionnaire survey was used to explore the opinion of a wider sector of FM Sector to further confirm and adjust the proposed model. Factor analysis with SPSS statistical software was used to help in the data analysis. The last stage was to evaluate and validate the model using Confirmatory Factor Analysis (CFA) with the help of AMOS software, and expert's feedbacks through a questionnaire.

From the findings of this research, it is strongly anticipated that the performance model proposed would enable the FM practitioners, on one hand, to better understand the FM service scopes and the performance specifications and targets that should be achieved within their capacities and the academicians, on the other hand, to introduce a FM tailored PM model and open up new possibilities for academic research, and emphasise an in-depth understanding of performance measures and criteria that need to be highlighted in the literature.

The PM model presented at the end of this study is ought to assist FM services to evaluate their performance level, in addition to enhance their services requirements in order to well supply their users.

DEDICATION

To my Homeland ….We will be BACK …

To my Smile ….my lovely Daughter Mariam

ACKNOWLEDGEMENTS

In the Name of Allah, the Beneficent, the Merciful

First of all I would like to praise Allah Almighty Who is the most Merciful, Knowledgeable and Worthy of all praises. He knoweth what before or after or behind us. Nor shall we compass aught of His knowledge except as He willeth.

Throughout this doctoral research study, many people gave their time, energy, commitment and encouragement, without them this work wouldn't have been possible. I would like to thank all those people who contributed in one way or the other to achieve this research study.

My sincere thanks are offered to my supervisor Dr. Taha Elhag who has been my academic guide during this research programme. I would like to thank him for his continued help, support, thoughtful comments, encouragement and commitment to my studies.

My greatest gratitude goes to my Father Mohamad Mawed, my mentor. Without his wisdom, love and constant support, I wouldn't be where I am today and wouldn't be looking forward to where I will go in the future. My Mother, Huda Mawed, is the one who sincerely raised me with her caring and gently love.

Words fail me to express my appreciation to my wife Sherin whose dedication, love and persistent confidence in me, has taken the load off my shoulder. I owe her for unselfishly letting her passions, and ambitions collide with mine.

Eman, Ahmed, and Sarah, thanks for being supportive and caring siblings. I am indebted to them more than they know.

I would like to thank also all of the academic staff and the colleagues that I had while I have been at the University for their Friendship and their encouragement.

ACADEMIC REGISTRY
Research Thesis Submission

Name*:*	Mahmoud Mawed		
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TABLE OF CONTENTS

LISTS OF TABLES

LISTS OF FIGURES

LIST OF PUBLICATIONS

A-Published

The below journal and conference papers were submitted, accepted and published by: Facilities, CIB, and International Conference on Sustainable Futures (ICSF)

A peer reviewed journal paper accepted and published in the Journal of Facilities, entitled "Using Big Data to improve the Performance Management in the UAE FM Industry" (Mawed, AL Hajj, 2016) in vol.35, issue 9/10.

- A conference paper published in CIB conference and entitled “The Impacts of Sustainable Practices on UAE Mosques’ Life Cycle Cost”. (Mawed, AL Hajj, 2014)

- A conference paper accepted in ICSF conference and entitled “Improving Construction Organisation Performance through BIM and 3D Laser Scanning” (Hammoud, Mawed, 2017)

- A conference paper published in ICSF conference and entitled Linking Between Sustainable Development and Facilities Management Strategies (Mawed, Bairam, 2017)

B-In Progress

The below journal and conference papers are in progress, submitted, or waiting for feedback published from: Facilities, International Journal of Operations and Production Management - IJOPM

- Another peer reviewed journal paper under evaluation to be published in the International Journal of Operations and Production Management and entitled "The Balanced scorecard versus the EFQM Business Excellence Model: Literature Review" (Mawed, El Hag, 2017). The paper reviewed the two wide spread business performance measurement literature, the BSC and the EFQM, analysed gaps in knowledge, in general, and advocated the need for a comprehensive

approach in measuring business performance combining those two models with others aspects of performance drivers and criteria.

- "Application of EFQM Excellence Model in the UAE FM industry" (Mawed, El Hag, 2017)

- "A Study of the Effect of Indoor Air Quality on Employee's Productivity in the UAE "(Al Shemery, Mawed, 2017)

LIST OF ABBREVIATIONS

AMOS	Analysis of Moment of Structures
BEM	Business Excellence Model
BIM	Building Information Modelling
BIFM	British Institution of Facilities Management
BSC	Balanced scorecard
CAPEX	Capital Expenditure
CAFM	Computer Aided Facilities Management
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CMMS	Computerized Maintenance Management System
CSF	Critical Success Factor
CSR	Corporate Social Responsibility
CR	Critical Ratio
DAC	Dubai Association Centre
DQA	Dubai Quality Award
EFA	Exploratory Factor Analysis
EFQM	European Foundation for Quality Management
FA	Factor Analysis
FM	Facilities Management
FMA	Facilities Management Association of Australia
FMP	Facilities Manager Professional
GCC	Gulf Cooperation Council
GFI	Goodness of Fit Index
GOF	Goodness of Fit
HAI	Healthcare Associated Infections
HSE	Health, safety and Environment
ICSF	International Conference on Sustainable Futures
IDPMS	Integrated Dynamic PM System
IPMS	Integrated Performance Measurement System
IFMA	International Facilities Management Association

ISE	Industrial and Systems Engineering
ISO	International Standards Organisation
IT	Information Technology
JFMA	Japanese Facilities Management Association
KMO	Kaiser Mayer Olkin
MEP	Mechanical, Electrical and Plumbing
MEFMA	Middle East Facilities Management Association
MLE	Maximum Likelihood Estimating
NFI	Normed Fit Index
NNFI	Non-Normed Fit Index
NQA	National Quality Awards
PCA	Principle Component Analysis
PM	Performance Measurement
PMF	Performance Management Framework
PMM	Performance Measurement and Management
PMS	Performance Measurement Systems
QHSE	Quality Health Safety and Environment
RADAR	Results, Approaches, Deploy, Assess and Refine
RICS	Royal Institution of Chartered Surveyors
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modelling
S.E	Standard Errors
SKEA	Sheikh Khalifa Quality Excellency Award
SLA	Service Level Agreement
SMART	Strategic Measurement Analysis and Reporting Technique
SPSS	Statistical Package for Social Sciences
SQSM	Service Quality Satisfaction Model
SWOT	Strength, Weaknesses, Opportunities and Threats
TFM	Total Facilities Management
TLI	Tucker-Lewis index
TQM	Total Quality Management
UAE	United Arab Emirates

Chapter 1 – INTRODUCTION

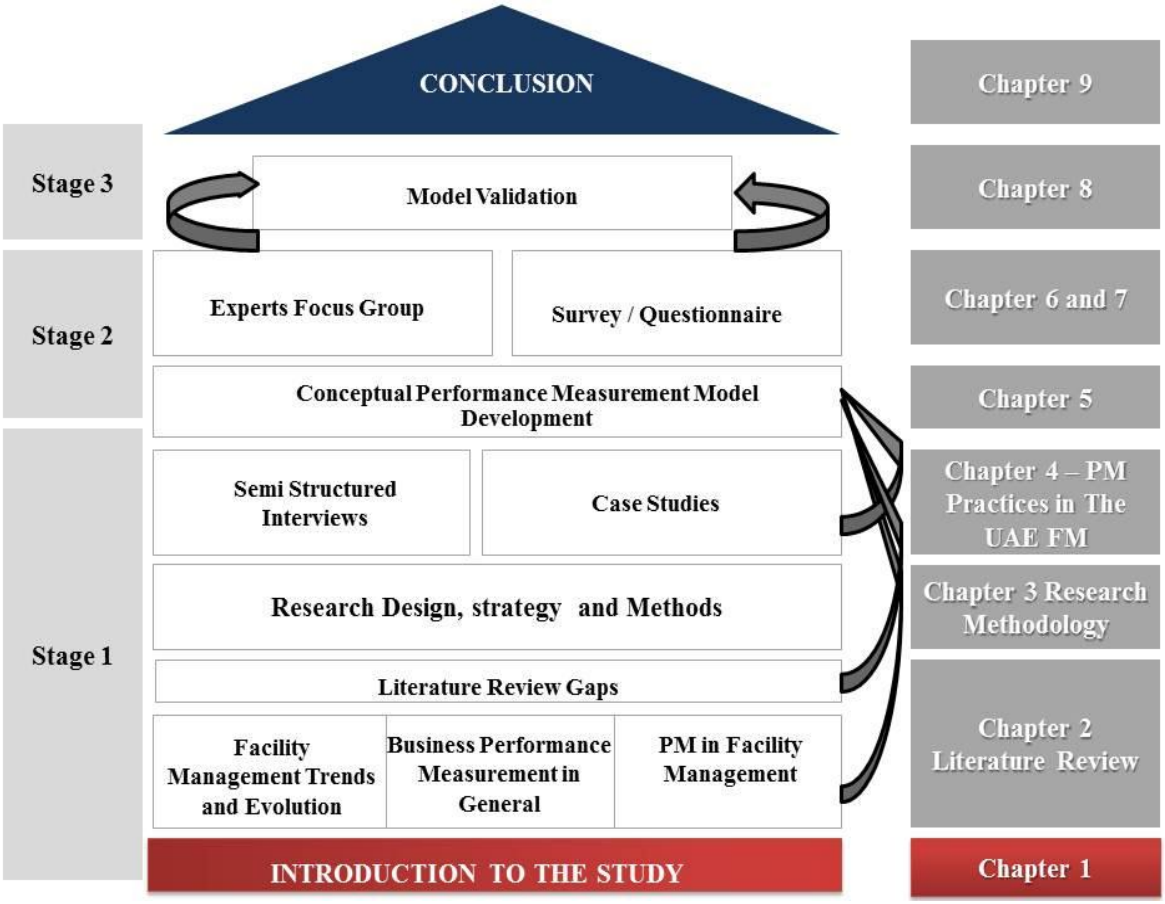


Figure 1 Research Structure - Chapter 1: Introduction

1.1 Introduction

The first chapter as indicated in figure 1 is the introduction chapter, it introduced the research rationale, background and problem, research scope, research aims and objectives, contribution to knowledge, research design, structure and methodology applied which will be discussed subsequently in details. This thesis seeks to achieve an important contribution to knowledge by exploring the implementation of performance measurement (PM) in facilities management (FM).

It aims to explore the key elements and criteria in measuring FM service performance and to recommend a comprehensive PM model which can support the FM service providers in the UAE in their service excellence delivery.

1.2 Rationale

The service industry organisations in general and the facilities management in particular are facing a tight competition, high resources costs and increasingly demanding customers. These factors lead the organisations to show their interest in adopting organisational performance management systems. Performance management systems are the key to delivering service excellence, to monitoring and controlling productivity and to achieving customer satisfaction for every service organisation (Lepkova and Zukaite-Jefimoviene, 2012).

However, whereas manufacturing businesses can manage easily to monitor and raise their productivity in their production and distribution processes (Mckinsey, 2017), service businesses face a number of challenges to improve performance: customized services, employee motivation and value addition are not easily predictable nor measurable (Drucker, 1999). Amaratunga (2000) emphasized on the importance of performance measurement as it was always a critical aspect of business management and was never an easy task especially when it is related to FM functions. And she added that the requirements identified for effective measurement of PMS are mostly suitable to cater for manufacturing industries, so there is a need to determine, verify and integrate the axioms of modern PM in the context of FM. In the same aspect, Chotipanich (2004) stressed the need to use performance management frameworks within the facilities management sector specifically: "The growing acceptance of a need to measure FM performance is in contrast with a lack of a systematic process for determining appropriate measures". He supported what Neely et al. (1997) related about the need of models which ensure that an accurate performance measurement encourages good improvements in business performance, and assist to identify the reasons why past performance shortfalls happened. The rising competition on providing the best quality of service, the flexibility requested by client, the innovation need and the success of specific improvement initiatives that rely on PM has pushed forward the organisation to show interest in performance measurement and management. Moreover, the proliferation of national and international quality awards and the power of information technology in the last two decades have made the performance management system on the top of the business organisations' agenda (Neely, 1999).

In the current context of FM, where there is a lack of a systematic process in determining appropriate performance measures, as well as some confusion regarding priorities and targets (Holloway et al., 1999), FM practitioners wish they can have a set of performance measures which is appropriate for measuring their service delivery performance (Amaratunga and Baldry, 2000). If systematically designed into a model, this set of performance measures will assist the FM practitioners to deliver the best value of their services and help them for further improvement (Myeda, 2013). In theory, the PM model established at the end of this study should help businesses or FM services to properly analyse their performance level and the service standards and requirements that they are aiming to deliver to their users.

1.3 Research Background and Context

Alexander (2003) claimed that facilities management business emerged over the last couple of decades as a response to the business environment and the recession in the 1980s and early 1990s. At that time FM was considered as one of the main cost-cutting initiatives when organisations started to outsource their secondary services (BIFM, 2012; Mohd-Noor and Pitt, 2009a). As a result, facilities management has been changed from an in-house function to an outsourced service to be delivered by service providers. Service Providers were then responsible for achieving the best value for money and performing efficiently to reduce their costs and maximize their profit margins (Kamarazaly et al., 2013).Hence, the FM organisations started implementing performance management systems to evaluate, monitor, and manage their performance.

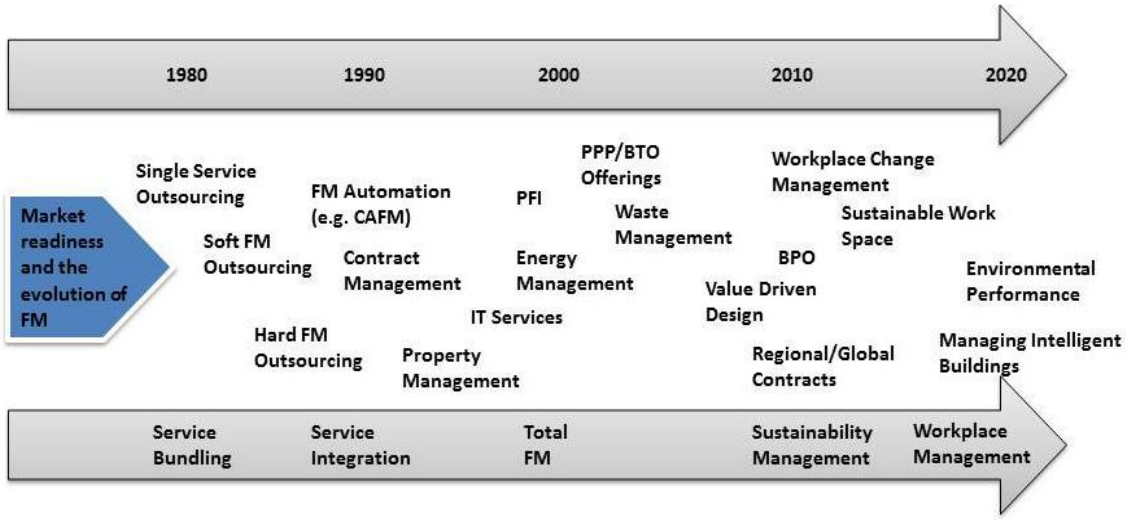
The interest in performance management models and their applications and implementations' impact has been manifested in the last three decades. Academic authors, practitioners, and consultants have even strived to design performance management models proper to each industry: manufacturing (Lynch and Cross, 1991; McNair and Watts, 2009), services (Fitzegarld et al., 1991), construction and facilities management (Baldry and Amaratunga, 2001; Bassioni, 2004), etc.

This research studies the performance management models and frameworks utilised in facilities management organisations. Today, the facilities management industry (FM) is one of the most rapidly growing industries, with projected growth to reach USD 394.69 billion by end of 2017, and USD 698.9 billion in 2020 according to the latest Global

Industries Analytics report. The FM has gone from being an in-house service to what is projected to be an industry worth globally USD 1.12 trillion by 2025 per annum as per IFMA 2016 report.

Figure 2 shows the historic evolution of the FM function and discipline. In the early 1980s, the facilities management services started as new business industry with a single-source outsourcing, beginning with soft FM services (cleaning, catering, food services, mail room, security, etc.) and expanded in the late 1980s to hard FM services (mechanical, electrical, heating, ventilation, plumbing, building control, management, fire and life safety systems, etc.). These services were often achieved by bundling individual service contracts. By the early 2000s, the facilities management services contracts started to be shaped in total or integrated facilities management services. Companies were looking for a single point of contact and one service provider offering an integrated offering and integrated solution with high added value sustainability initiatives (Frost and Sullivan, 2012; Hodge et al., 2014).

Figure 2 Evolution of FM type of Contracts



Source: Frost and Sullivan (Pitch to ISS, May 2013)

In their white paper, Hodge et al. (2014) confirmed that outsourcing of facilities services has enlarged significantly in the last decade, with the majority of the growth coming from the emerging Asia Pacific markets. Although the United States and Europe represent two dominant facilities management markets, grouping a substantial share of the worldwide revenue, Global FM market growth is dependent on the growth of Asia and the Middle

East which is now turning out to be a buoyant region for FM growth (Frost and Sullivan, 2013).

Led by real estates' advances, the Middle East market is projected to emerge as the world's fastest growing market for facilities management (Deloitte, 2016).

Certainly, the FM industry growth over the last twenty years has been achieved by corporate leaders, who realized the strategic role of FM organisations in aligning their service delivery with the clients' goals and missions, maximizing the performance of the facilities physical assets, and using the required technology to enhance their planning and operations (Mbachu, 2013).Moreover, by integrating people, process, place and technology, FM organisations can be identified as high-performance organisations and are able to provide the best value for money while minimizing their operating costs (Chotipanich, 2004).

The literature review as well as the case studies conducted proves that the FM organisations need a performance measurement model accentuating on improving performance and to assist FM services to evaluate their performance level and to enhance their services requirements in order to well supply their users.

1.4 Research Focus

As mentioned above, the research study on the performance management of the FM organisation is justified by the growth realised in this industry worldwide in the last few decades and the multiple challenges and pressures facing those organisations in their performance attainment. The research focus of the thesis is centred on the GCC Region and more specifically the UAE FM Market. Facilities management market in Gulf countries (GCC) has recently evolved to contend with rapid infrastructure development and building construction boom (The Economist, 2009).

The massive growth in the construction of new complex and high-end commercial and residential developments, airports, roadways, ports and railways along with the aging of existing facilities and building, opened significant opportunities for growth of a high-quality FM service (Credo, 2013).

1.5 Research Aim and Objectives

The main aim of this research is to recommend a comprehensive performance measurement model to be used by FM organisations in the UAE

In order to achieve the research aim, the following key objectives were set:

- **Objective 1:** To identify and assess the performance measurement models used in different sectors.
- **Objective 2:** To review the facilities management scope, structures, models and evolution, with a specific focus on the UAE
- **Objective 3:** To explore the current performance measurement systems in the FM industry, and review how performance is measured in the FM organisations in the UAE
- **Objective 4:** To identify and evaluate the performance measures and criteria that defines the successful FM Organisation
- **Objective 5:** To develop a model based on the outcomes of the above objectives that measure the performance of facilities management organisations
- **Objective 6:** To evaluate and validate the proposed performance measurement Model

1.6 Research Methodology

The research follows a mixed or balanced approach between qualitative and quantitative (known as triangulation method). In social sciences research, there is privileged attention focused on "triangulation" (Yin, 1994). Das (1983) stated that quantitative and qualitative methodologies are not divergent, but they focus on the different dimensions of the same phenomenon: the weaknesses in an approach are normally compensated by the counter balancing strength of the other.

So to achieve the research objectives, the following steps summarises the methods followed:

1. Conduct a **literature review** to explore the current performance measurement and management issues, and analyse the gaps in knowledge especially in the UAE market through semi structured interviews;

2. Exploring the performance measurement practices in the UAE using semi-structured interviews and case studies.

3. **Theoretically develop the conceptual PM model** that can enhance performance management experience and monitoring within the FM industry by leveraging on the literature review and case studies findings;

4. Modify the model based on the **Faculties Management experts' focus group** workshop;

5. Conduct a **questionnaire survey** (quantitative method) to explore the opinion of a wider FM Sector to confirm and adjust the proposed model, Factor analysis with SPSS statistical software were used to help in the data analysis;

6. **Evaluate and validate** the model via a questionnaire survey output using confirmatory factor analysis (CFA) analysis (with the help of AMOS software), and experts feedbacks through a questionnaire

Table 1 displays the research objectives and the methods used to achieve them:

Table 1 Proposed Research Methods

Research Objectives	Methods (Methodology)
Objective 1: To identify and assess the performance measurement models used in different sectors	Literature Review
Objective 2: To review the facilities management scope, structures, models and evolution, with a specific focus on the UAE	Literature Review and Initial semi structured interviews
Objective 3: To explore the current performance measurement systems in the FM industry, and review how performance is measured in the FM organisations in the UAE	Literature Review and Initial semi structured interviews and 3 case Studies
Objective 4: To identify and evaluate the performance measures and criteria that defines the successful FM Organisation	Literature Review and Initial semi structured interviews and 3 case Studies and Focus Group
Objective 5: to develop a model based on the outcomes of the above objectives that measure the performance of facilities management organisations	All of the Above and Questionnaire Survey with Exploratory factor analysis (EFA) using SPSS
Objective 6: To evaluate and validate the proposed Performance Measurement Model	Experts Feedback and Confirmatory Factor Analysis Using AMOS

Based on this, the methodology was comprised of three main stages to be discussed below and demonstrated in figure 3:

Stage 1

First stage is an inductive approach started by literature review of facilities management and performance measurement models used in this field. Then a series of semi structured interviews and relevant case studies served to provide an insight on the performance measurement practices in the UAE FM organisations.

The findings of the literature review and these exploratory interviews along with the findings of case studies conducted on three FM service providers were then used to develop the proposed comprehensive PM model that focuses on the facilities management features.

Stage 2

The aim of the second stage was to seek the opinions of a panel of experienced experts through a deductive approach. Findings from the workshop were analysed and then helped in developing a survey questionnaire to examine the model validity and acceptance by the FM market.

Stage 3

During this stage, an inductive approach was followed in which the professional feedbacks who have a high experience in FM industry were gathered. In addition to that a confirmatory factor analysis was conducted.

This stage presents the validation of the model that was developed during previous stages. The model validation, which is the last phase of the study, was conducted using two consecutive methods first is empirical using statistical technique called Structural Equation Modelling with the confirmatory factor analysis process (CFA), then the model was presented to experts who are experienced in the Facilities Management industry and Performance management systems and asked their opinion about the feasibility of the model, and the suitability of its structure and the performance measures.

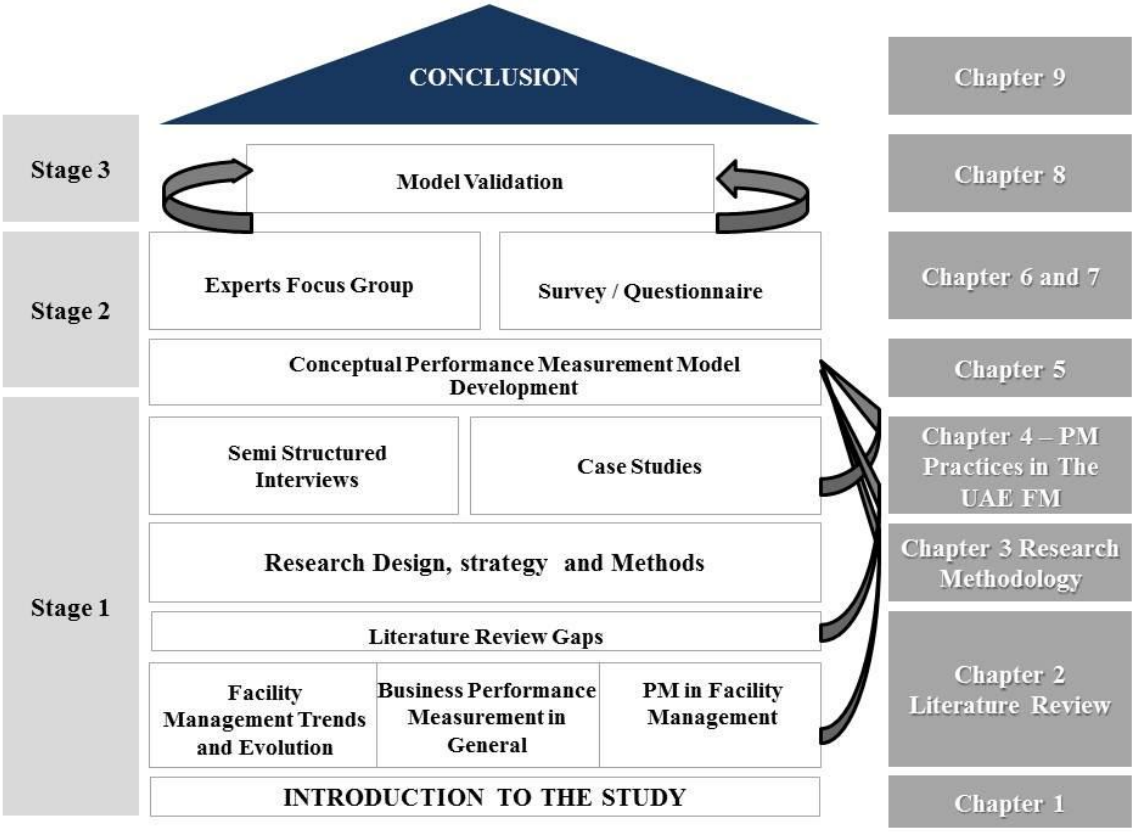


Figure 3 Research Design Flowchart (Structure)

1.7 Contributions to Knowledge

Previous research focused mainly on the content of strategic performance management system for organisations in general (Myeda et al., 2012), but only few tackled the service industry and very scarce study were conducted specifically on Facilities Management (FM). By conducting this research, it is aimed that various FM aspects to be monitored and managed within a comprehensive performance model to achieve continuous improvement.

This thesis provides knowledge in the form of a comprehensive performance management model which not only measures performance of the FM organisations but also provides a clear guideline to the FM services providers to improve the current FM practices in the United Arab Emirates.

The contribution to knowledge may be identified in terms of a critical examination of performance measurement role and its implication on the organisation over a wide range of performance criteria including financial and non-financial aspects.

a. Benefits to Facilities Management Industry

With the development of the comprehensive PM model, it is expected that organisations will have a clear guideline of performance model which guides them to make a solid base of structured processes and allow them to benchmark internally and externally their departments and services in order to achieve excellence and continuous improvement.

b. Benefits to Academia

Although the Performance Management subject is widely considered by researchers, the focus of PM in relation to facilities Management organisations performance is still missing the interest and the required coverage. Existing studies tackle the establishment of various performances models and the introduction of their concepts into the FM discipline. However, none has evaluated the UAE Market, a leading market in the FM in the Middle East and North Africa Region and examined the effectiveness of the application of these models. This thesis will open up new possibilities for academic research, and will emphasise an in-depth understanding of performance measures and criteria that need to be highlighted in the literature. And it will give an overview of the PM approaches in FM practice, which will serve as a good reference for other researchers.

1.8 Thesis Structure

Figure 3 outlines the dissertation structure and the key milestones engaged in this research study, it shows that the thesis is developed through nine chapters as below:

Chapter 1 – Introduction – This chapter introduces the thesis, offers an overview on the background and the research needs, the main aim and objectives. It outlines the research methodology design and approach and presents the main research's contribution to knowledge. The structure of this thesis is presented at the end of chapter one.

Chapter 2 – Literature Review – This chapter presents and analyses the different perspectives of which the performance management and measurement systems were described throughout the history. An extensive literature review was analysed in three sections encompassing the facilities management sector development issues and challenges, the performance measurement and management models throughout the history and the models specifically designed for the FM industry. This in-depth review drives the researcher to identify the gaps identified and to justify the need to pursue the study objectives and aims via the research's approaches and methodology.

Chapter 3 – Methodology and Research Methods – This chapter discusses various epistemological design approaches, design, process, scope, limitations and sets out the relevant research methods to this study. The triangulation method based on a qualitative approach (interviews, case studies and focus group) and a quantitative one (survey) is adopted.

Chapter 4 – This chapter entitled the Performance Management Practices in the UAE FM Market presents the initial interviews and case studies findings offering a clear overview on the practitioner's issues and challenges in implementing a performance measurement system.

Chapter 5 – This chapter handles the formulation of the conceptual PM Model based on the stage I (literature review and case studies), where performance factors are identified, relations outlined, operational definitions conceived and variables defined.

Chapter 6 – Focus Group **-** The chapter 6 presents the focus group and the workshops realised with FM experts in order to discuss and validate the performance measurement model conceptually defined in this research. The focus group workshops aim at enhancing the PMS model by incorporating the right and necessary metrics that are needed in the FM industry.

Chapter 7 – Survey Questionnaire -This chapter used the focus group findings for designing a survey questionnaire to capture the opinions of FM experts about the performance measures developed at the previous stage. The data gathered were statistically analysed using SPSS software to establish the structure of the measurement model and uncover the performance dimensions in each perspective and compare it with the results of focus group workshop outcomes.

Chapter 8 – Validation-This chapter presents the validation of the model that was developed during previous stages. The model validation, which is the last phase of the study, was conducted using two consecutive methods first is empirical using statistical technique called Structural Equation Modelling with the confirmatory factor analysis process (CFA), then the model was presented to experts who are experienced in the Facilities Management industry and Performance management systems and asked their opinion about the feasibility of the model, and the suitability of its structure and the performance measures.

Chapter 9 – Conclusion and recommendations – This Chapter concludes on the main summaries reflected throughout the thesis, the generalization pulled out from this study by reviewing the findings that successfully achieved the research objectives, the contribution of knowledge to the FM industry. It also proposes the limitations of this research as well as the recommendations for future research in the field of FM.

Chapter 2 – REVIEW OF PERFORMANCE MANAGEMENT MODELS IN FACILITIES MANAGEMENT ORGANISATIONS

2.1 Introduction

This chapter synthesizes the relevant literature reviewed in depth on the general performance measurement and management theories developed all over the history of business management as well as the one specific to the scope of the study, the facilities management industry. A holistic review of research journals, articles, books, and websites and business reports relevant to the objectives of the research study helped in developing an understanding of performance factors which are perceived as important and may influence the performance in facilities management field. Besides, measuring performance in a service based industry, namely the facilities management, and unlike manufacturing industries, has never been easy to predict nor to measure.

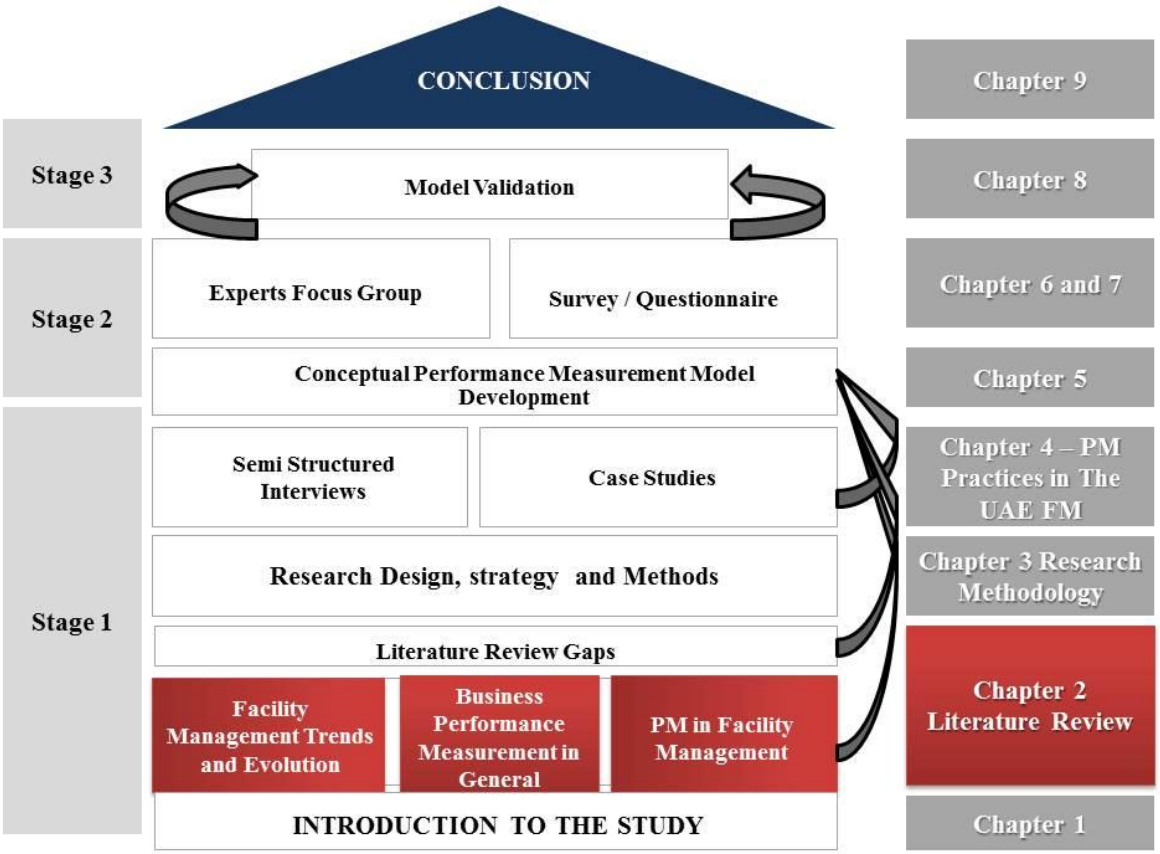


Figure 4 Research Structure - Chapter 2 Literature Review

As indicated in figure 4, the literature review was presented in this chapter under three main parts or sections:

1. A historical evolution of the facilities management industry, trends, special characteristics that distinguish the FM service provider from any other organisation.
2. A theoretical review of the concept of corporate performance management, its importance and the key models applied in practice and their limitations.
3. An overview of the performance management models especially designed for the facilities management industry, their main metrics and features.

The literature review is crucial at a first stage to investigate the theoretical performance models in the FM discipline and to identify the gaps in literature once compared with the FM organisations' practices of performance management.

Although some studies have appeared in recent years for the applications of individuals models in FM in specific areas such as healthcare facilities (Amaratunga et al., (2001; 2002) and Shohet (2006), there is a lack of systemic investigation of performance management in the context of FM as a service organisation. Literature on performance management in facilities management is scarce; it even does not exist in the context of the UAE where the FM is facing many challenges to support the massive real estate development projects and growth and to follow the governmental vision 2030. A critical analysis of the various existing FM specific models developed throughout the literature will follow allowing a clear conclusion on a comprehensive performance management model that best matches the facilities management industry characteristics.

A summary of the main gaps issues and matters uncovered in the literature were addressed in the end of this chapter.

2.2 Evolution of the facilities management industry

This section discusses the evolution of the facilities management from a support department or entity to a strategic business support playing a significant role in overall organisation's success. This section starts with a brief definitions' spectrum given to facilities management throughout the scholar's researches and literature, the scope of works, importance, innovation and growth. It also focused on the main drivers of the facilities management industry growth in UAE, the main challenges the service providers are facing while improving their organisations and service delivery.

2.2.1 Introduction

Even though, the FM discipline dates back to the 1970s in UK and USA (Atkin and Brooks, 2000; Moseki et al., 2011), it emerged officially in the late 1980s and early 1990s as a response to the business environment and the recession in the European countries (Price, 2002). Since then, it has witnessed a tremendous global growth entering developed countries in the mid-1980s (Levainen, 1997) cited by (Dubem et al., 2012).

Facilities Management appeared as a discipline embracing more than operational concerns of building maintenance and comfortable working environment (Best et al., 2003; Ong, 2009). Facilities management can cover a wide range of services including property management, financial management, change management, human resources management, health and safety management, in addition to core visible hard services such as building maintenance, soft services such as cleaning, landscape and security and utilities supplies (Amaratunga and Baldry, 2003).

Then (1999) displayed the strategic role of facilities management on the organisational and economic level as the essence of FM lies in the ways in which facilities are tuned to business needs. Alexander et al. (2006) gave to the FM definition a broader perspective as it does not only focus on economic capabilities, but also looks carefully at social and environment benefits. A global overview of the FM industry worldwide and in the GCC countries, namely the UAE, is presented here after developing the major FM models and structures recognised in FM practice and researches.

2.2.2 Definitions of Facilities Management

Literature reveals many definitions of the FM of which we retain few. Becker (1990) defined the FM as the discipline "responsible for managing and coordinating all activities and tasks related to planning, managing and designing of buildings, along with equipment, furniture, systems, and infrastructure for enhancing the ability of organisations to successfully compete in a rapidly changing environment". The FM is then concerned with the dynamic interaction between an organisation's personnel, process and place (Laird, 1994) and technology (Transfield and Akhlaghi, 1995). Nutt (2000) defined precisely the role of FM to provide "appropriate and logistic support to sustain the organisation's core business, operations, groups, individuals, project teams, suppliers and customers". Few years later, the International Facility Management

Association (IFMA, 2010) published a comprehensive definition of FM as a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology. At the same time as, BIFM, the British Facility Management Association, stressed on the integration and alignment of the non-core activities and processes within an organisation to maintain and develop the agreed services and support organisations' primary activities (BIFM, 2010; Pitt and Tucker, 2008; Alexander 2010). BIFM highlighted that the FM is essential in providing a safe and efficient working environment which leads subsequently to an improved business performance.

Table 2 sets out a sample of various definitions of FM that reinforce each other, and highlight the FM functions. The FM was obviously getting more attention throughout history and being increasingly considered as a strategic and commercially oriented discipline affecting not only revenues and costs but also production, employees' welfare, health and safety, customer satisfaction, the work environment and productivity, and the ability to recruit and hold employees (Abdul Wahab, 2006; Cotts and Lee, 1992).

Table 2 Definitions of Facilities Management

Authors/ Organisations	Definition
Becker (1990)	"FM refers to the management of occupied workplaces and their related building systems, equipment, and furniture in the intention to improve the organisation's ability to meet its objectives."
Cotts and Lee (1992)	"FM consists of coordinating the physical workplace with people and systems in the company; incorporates the principles of business administration, structural design, and the employee behavioural and engineering sciences."
Alexander (1999)	"FM is the process by which an organisation delivers and sustains agreed levels of support service in a quality environment at appropriate cost to meet the business need."
Then (1999)	"A hybrid management discipline combining people, property and process management expertise to provide essential support services to the organisation."
Chotipanich (2004)	"The support function coordinating the physical resources along with the process of works and the support services to the users in a workplace allowing the enhancement of its core business of the organisation. "
Noor and Pitt (2009)	"Establishing an environment that is cohesive to carry out an organisation's primary operations, taking an integrated view of the infrastructure and support services in order to ensure a customer satisfaction and value for money."
IFMA (2010)	"It is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology."
BIFM (2010)	"It is the integration of process within an organisation to maintain and develop the agreed support services in order to improve the value of its primary activities."

Source: Noor and Pitt (2010) (adapted)

2.2.3 Scope of FM Services

Whereas there are mainly two types of FM services, namely hard and soft FM, they have extended to comprehend a variety of services that support the operation of the service asset as the occupants' wellbeing (IFMA, 2012).

Hard FM relates to the services intended for the building systems including maintenance of buildings, engineering, air-conditioning system, electrical system,

plumbing system, fire-fighting and fire prevention system, security system, building control system, building management system and building fabric works.

Soft FM focuses on the maintenance of catering, cleaning, health and safety, landscaping and internal plants, security, pest control, handyman, waste disposal and some other support services.

IFMA (2012) added an "Additional services" category for other services, namely printing, reception services, information systems, space planning, and management services such as business risk assessment, business continuity planning, benchmarking, performance management and also contract procurement.

The FM services have evolved clearly from being generic ones such as real estate building construction, landlord activities, building operations and maintenance, and facilities planning (Thomson, 1990), to three categories, premises, office and central services, as defines by Barret (1995).

Few years later, Moore and Finch (2004) added the information technology aspect in their proposed FM departments. Chotipanich (2004) posted nine service scopes which are real estate and property management, facilities project management, maintenance and repairs, building services and operations, office services, planning and programming, space planning and management, operations administration or management, and employee supports and services.

Myeda (2013) presented six types of services classification perceived by the authors within the last two decades as shown in table 3. The BIFM (2007) provided a holistic layout of FM services based on Alexander's (1997) list of three FM components that are premises, support services and information services. The scope is not limited to the daily operation but also to strategic aspects which define the FM as a total management of facilities and people related services.

Table 3 The scope of FM services

Thomson (1990)	Barret (1995)	Jones (1996)	Moore and Finch (2004)	BIFM (2007)	
Real Estate and Building Construction	***Premises***	***Strategic Consultancy***	IT Management	***PERMISES***	***SUPPORT SERVICES***
New building design and construction management	Building Maintenance	Space and designs studies	Real Estate	Real Estate	Mail Services
Acquisition and disposal of sites and buildings	Decoration Work	Acquisition and disposals	Outsourcing (support services)	Property Asset Management	Vehicle Fleet
Negotiation and management of leases	Sub-contractors	Refurbishment	Maintenance (planned maintenance, IT etc.)	Site Selection	Catering
Advice on property investment	Telecommunication	Relocation planning	Space Management	Relocation	Reception
Control of capital budget	Security	Budgetary control	Environment/health safety	Lease Management	Housekeeping
	Safety		Property Management	Acquisition	Office Administration
Landlord Activities	Cleaning	***Specialist Support***		Disposal	Furniture
Assignment and sub-letting		Security	**Chotipanich (2004)**	Space	Refuse Disposal
Promotion/Market support	***Office Services***	Cleaning		Chum Planning	Reprographics
	Mailing	Cleaning	***Real Estate and Property***	Furniture Layout	Security
Building Operations and Maintenance	Stationary	Internal	Management	Partition Layout	Stationery
Run and maintain plant	Photocopying	External	Facilities Project Management	Space Utilisation and functions	Travel
Maintain building fabric	Vehicles		Maintenance and Repairs	Maintenance	Vending
Manage and undertake adaption	Printing	***Maintenance services***	Building Services and Operations	Structure and Fabric Maintenance	Document Management
Energy management		M and E Services	Office Services	Service Maintenance	
Security	***Central Services***	Structure and Fabric	Planning and Programming	Finishes Maintenance	***INFORMATION SERVICES***
Voice and Data Communication	Catering		Space Planning and Management	External Areas Maintenance	Data Network
Control Operating Budget	Room booking	***General Services***	Operations Administration	Energy Management	Systems Integration
Monitor Performance	Insurance	Copying	Employee supports and Services	IT Infrastructure	Voice and data network
Supervise cleaning and decoration	Archival	Mail		Telecommunications Infrastructure	Network Management
		Messengers		Security Infrastructure	Wiring Installation
Facilities Planning		Transport			Planning and Design Studies
Strategic space planning		Portering			Software Development
Identify user needs					
Space planning (furniture layouts)		***Information Technology***			
Monitor space use		System purchasing			
Select and control use of furniture		Systems operations			
Define performance measures		Telecommunications			
Computer aided facilities management		Manpower			
		Training and Development			
		Business Travel			

Source: Myeda 2013

2.2.4 FM Growth and Development

FM has built up itself as a key and innovative service sector, with a diverse FM structures and contractual forms from in-house FM departments, FM vendors or contractors, to FM specialized service providers, and expert Integrated FM organisations (Nutt, 1999; Tay and Ooi, 2001).

This section presents a brief synopsis of the FM history and evolution, the consecutive generations witnessed, the various FM business models and structures proposed in previous researches and the innovation need in service delivery in order to maintain their competitiveness.

According to BIFM (2007), many factors animated the FM development. Global competition and the dilemma of "cutting cost vs. excellent service delivery" are the main ones. In addition, the increasingly demanding customers pushed the FM organisations to seek always new technologies or advancements and efficient innovations solutions in order to grasp their customer satisfaction (Amaratunga et al., 2002).

2.2.4.1 Facilities Management History: Past, Present and Future

The origins of facilities management discipline can be traced back to the seventies when the office workplace started to evolve with computer workstations and cubicles designs (Robertson 2000). As the offices and workplaces continued to evolve, the need to control and look after these facilities began to grow. Hence, the facilities management concept is born. However, it was not officially recognized until 1980s in the US and the UK (Moore and Finch, 2004). Since then, the FM has gradually gained popularity and witnessed the establishment of professional FM institutions around the world (IFMA in the USA, JFMA in Japan, BIFM in UK, FMA in Australia, MEFMA in the Middle East Region etc.) (Linda et. al., 2001). Despite the popularity of this rising and trendy discipline, there are still people who don't really appreciate and to certain extent are misguided on the roles and responsibility of FM (Myeda, 2013).

The facilities management has evolved from just looking after "hard" services such as buildings, equipment and furniture (Becker, 1990) to looking at "soft" support services such as people, process, environment, health and safety which has been included in Alexander and Then definitions (1999). The previous section shows how the position and

importance of the FM, based on its definition of scope, was changing, expanding and extending their underneath services. Today those services have expanded greatly to incorporate five main dimensions as depicted by BIFM (2007) the premises, the support services, the space, the information services and the maintenance as well as the change management, the financial management, the human resources management, the health and safety, the contract management, in additional to utilities supplies and sustainability initiatives (Kamaruzzaman, 2010).

The Facilities management discipline has made a big revolution within management thinking. In the 1980s, the FM department was seen as an overhead cost to the organisation (Madikizela, 2014). Today, it is viewed not only as operational but also as a strategic function. The FM aims at ensuring the reflection of the client's strategy and vision in its daily operations, the positive impact on the environment while keeping services costs within budgetary targets, the welfare of the workplace occupants and the optimization of resources utilization (Abdul Wahab, 2016).

Within the last decade and despite the world economic crisis, FM has been an active sector in which it was not just about delivering services in the most effective ways. FM is also about providing them in an ever-evolving world/industry where the customers are more exigent in terms of innovative integrated solutions and demanding in higher added value (Mohd-Noor and Pitt, 2009b). The FM is then viewed as a management of cost-efficiency and stakeholder satisfaction rather than a tool of provision of a multidimensional support service (Myeda, 2013).

In the near future, the facilities management, being driven at this moment by a mix of technologies and evolving demands in green initiatives will be transformed once again to follow the "smart city" concepts, the "internet of things" technologies and the data analysis (I-scoop report, 2017)

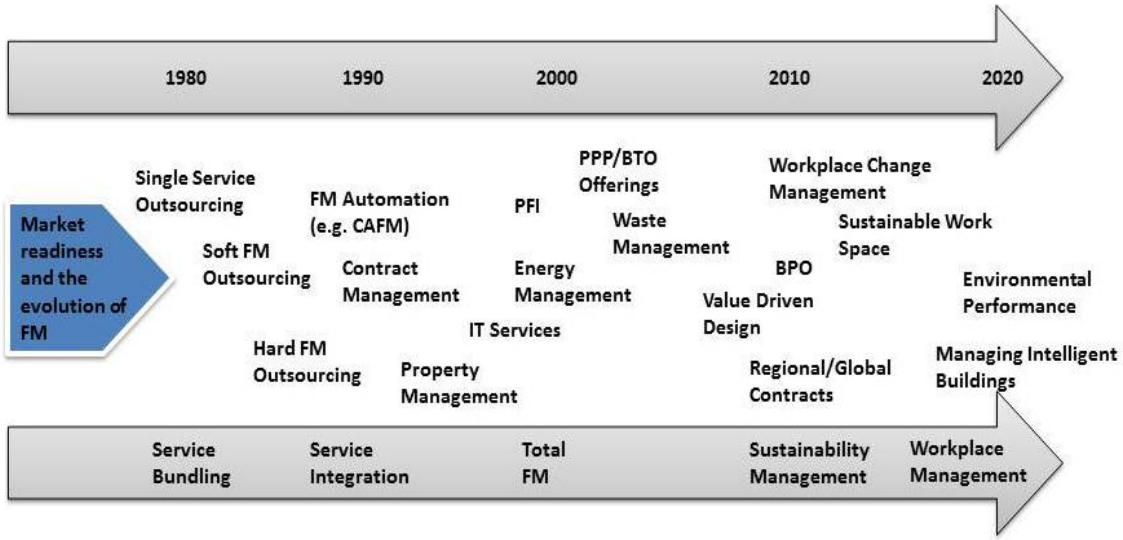
2.2.4.2 Facilities Management Generations

Facilities Management industry has extensively evolved over the last four decades and passes through four main categorized generations.

Figure 5 shows the chronological evolution of the FM business structure. In summary, the first generation witnessed in the 1980s a rise of single-source outsourcing of soft FM services (cleaning, catering, food services, security, etc.), and a move in the late 1980s to

hard FM services (mechanical, electrical, heating, ventilation, plumbing, building control, management, fire and life safety systems, etc.). These services were often achieved by bundling individual service contracts.

Figure 5 Evolution of the FM business structure



Source: Frost and Sullivan, (Pitch to ISS, May 2013)

In the 1990s, there was a move toward service integration, facilitated by the FM automation (e.g. Computer Aided Facility Management System (CAFM)) (Then, 1999). In the early 2000s, companies started turning to the outsourced FM solutions in all support and internal functions including payroll, human resources, finance and other internal functions outsourcing – as well as waste management. Throughout the 2000s, innovation, synergy and value-driven designs entered the equation, transforming the contracts into total FM contracts.

Currently, in the last generation, the FM service providers are focusing on strategic business and environmental solutions such as workplace change management and risk mitigation as a competitive advantage to increase the value they deliver to the client (Andersen and Ankerstjerne, 2012). In the last few years, the facilities management is viewed as a strategic business partnership where services to smart buildings and to smart city are to be conceptualized (WIPRO, 2016 P.17-18).

It is obvious that each generation has been marked by some general trends and encountered problems or issues that the following generation attempted to resolve. Then (1996) identifies the factors that contributed to the changes observed in the FM function at each stage during the past. Table 4 disclosed that the general trends of each generation

is based on the perception of the FM by stakeholders and the evolution of the FM services or structures went from single to bundled to integrated processes in line with the customer's needs and acceptance.

Table 4 The Facilities Management Four Generations

	Period starts in	General Trends	Main Problems / Challenges
First Generation	1980	- Characterized by FM isolated functions and being perceived as an overhead expense (Becker, 1990)	- Management based on minimum cost rather than optimum value (Alexander 1996; Price and Akhlaghi, 1999). - Tension between departments: Finance believe that FM represents an overhead to the organisation and facilities managers believe that "FM has not given due recognition" within the organisational setting. - On a strategic basis, lack of applicability of the output of the FM function and its lack of concern for the organisational effectiveness.
Second Generation	In 1990	- FM seeks to promote continuous process within the organisation. - FM is seen as the integration of FM processes	- Need to concentrate on developing integrated, accountable and value adding services. - FM attempts to identify FM processes rather than identify specific FM "functions". - FM processes identify needs; ensure quality provision and monitoring processes that enable control (Alexander, 1993b).
Third Generation	In 2005	- FM is seen as more concerned with "resource management", - Resource integration with the emphasis on provision of an enabling working environment where the issues of people, processes and property are elements of the same problem seeking a common solution (Then, 1999). - This generation of FM stresses the importance of understanding FM as a business context. (Alexander, 1993).	The trend towards organisational "downsizing" and "outsourcing" collectively imposed an onus on many organisations to seriously review their internal competencies necessary for managing the "new era of choices and flexibility" (Then, 1999). Closer integration of facilities and a more appropriate focus on user and strategic needs brings important business advantages.
Fourth Generation	since 2010	-Needed of an alignment between organisational structure, Work processes and the enabling physical environment.	Debate is still open between a trend towards an integrated FM or a total FM

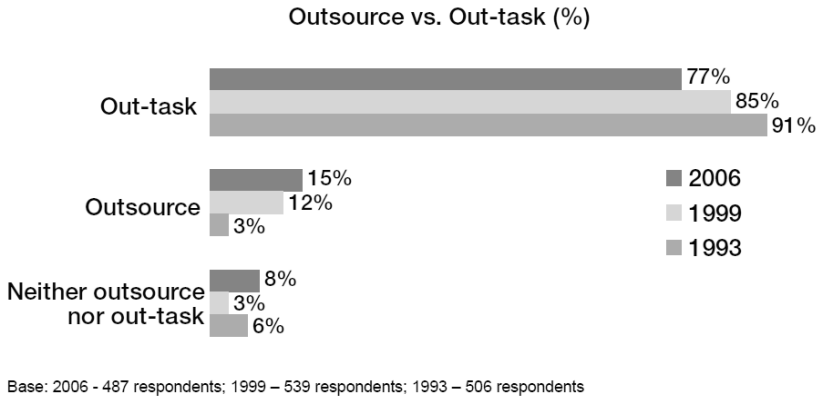
Source: Hodge et al., 2014 (adapted)

2.2.4.3 FM Business Outsourced Agreement or Structures

During the 1990s, the FM outsourcing has gradually become an accepted business practice even though it is not always a popular decision (IFMA, 2006). In their comparative study, the survey conducted by IFMA highlighted that focusing on and investing in the success of core business is the main reason for outsourcing decisions in 2006 whereas reducing costs and accessing specialty skills were the main drivers towards outsourcing in 1999.

Figure 6 shows clearly that over 13 years, the use of out-tasking (hiring individual, specialized vendors to provide one or more FM functions) has slowly dropped from 91% in 1993 to 77% of companies who out-task in 2006. In Parallel, the use of outsourcing has risen from just 3% in 1993 to 15% in 2006. Clearly, the in-house services have also increased slightly from 6% to 8% due to strategic and security reasons in some critical facilities.

Figure 6 FM Outsourcing Evolution



Source: IFMA, An Inside look at FM outsourcing Research Report 27 (2006)

With regards to types of contracts, Barret (1995) classified the FM function by type of operational mode (in-house, outsourced, localised site, model, multiple side model, internationalized site model) (Amaratunga et al., 2001). However, Atkin and Brooks (2000) suggested classifying it by types of contractual relationships in facilities management outsourcing.

The managing agent is adopted when an organisation brings in an external experienced agent to manage the services more efficiently and effectively, and oversees the service providers on behalf of the client (Ekadashi, 2014). The arrangement takes place when the

organisation appoints a contractor to manage all the services under its contract. Service providers or subcontractors have no contractual relationship with the client organisation.

A third type of contract is a total facilities management arrangement by which the organisations pass the full responsibility for managing their facilities in a whole range of bundled services with totally responsibility for the delivery, monitoring, control and achievement of defined performance objectives in the contract (Atkin, 2003).

2.2.5 FM Spectrum: Business Management Models and Structures

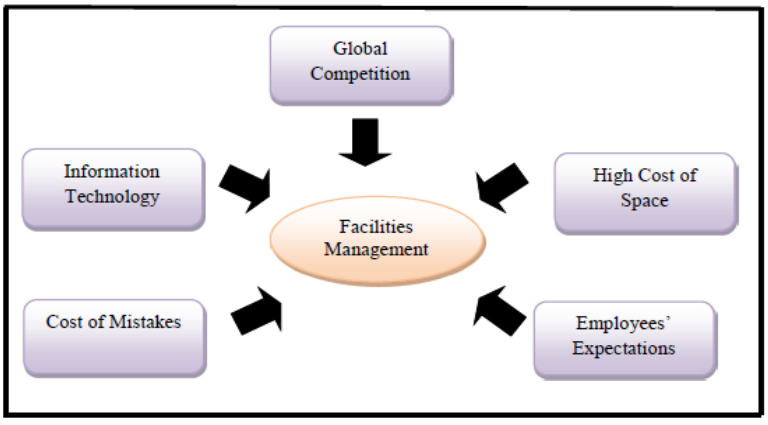
Researchers attempted to conceptualize some facilities management business models to help the practitioners in adopting the model that best fit their structures and their strategies and vision. FM departments vary considerably from one organisation to another (Amaratunga, 2001) mainly due to their configuration with regards to the needs of their organisation (Barrett, 1995).

In all models, presented here below, developed by Becker's (1990), Barret (1995), Alexander (1992), Kincaid (1994) and Nutt (2000) the studies focused on the factors which impact the theoretical development of the facilities management.

2.2.5.1 Becker's Factors for Stimulating the Growth of Facilities Management

While exploring the facilities management field, Becker (1990) identified five important factors driving FM towards achieving the continuous improvement of an organisation. Figure 7 shows those five factors stimulating the growth of FM.

Figure 7 Becker's Factors for Stimulating the Growth of FM



Source: Becker (1990)

Each of the factors shown in figure 7 can impact the organisation and can facilitate the FM's ability to provide quality services and achieve the objectives of the core business.

According to Becker (1990), global competition influences the organisation's decision and leads them to efficient resource utilization and a tight focus on buildings, furniture and building system to achieve cost efficiency and competitive advantage.

The cost of space is the next factor where the modern building space has continually risen but old buildings cannot accommodate the advanced technology; they are inefficient and become a liability.

In addition, information technology is an optimal requirement and its implementation has become a technical discipline for modern organisations.

The fourth factor is increasing employees' satisfaction/ expectations, which focuses on the working environment that will influence the productivity of employees.

The final factor introduced by Becker (1990) is minimizing errors. Organisations need to avoid errors while dealing with facilities planning to save the organisation's time and money.

2.2.5.2 The Barret FM Generic Model

Barret (1995) inspired by the study of Ashby (1963) and Beer (1985) develop the generic model showing how an ultimate facilities department would interact with the core business and the external environment and where the linkages and interactions between FM and the organisation are very significant in leading the organisation towards a quality business environment (Amaratunga, 2001). The model differentiates between strategic and operational FM, highlighting the need to consider the future situation, as well as the current one.

Barrett (1995) and later Fleming (1998) analyzed two types of management level of FM, which are the operational level and the strategic level:

- The operational level basically focuses on communication and interaction with core business departments to identify requirements, on benchmarks the existing facilities and on the daily provision of support services.

- The strategic level which covers the interaction of FM within organisation to study the potential decisions in FM and their impact on facilities and the employees' welfare while keeping the budgetary targets.

Overall, the generic model is a contribution by Barrett (1995) to previous researches based on systems theory and information processing to upgrade the FM organisation to be more effective and efficient in the future. Barrett (2000) accentuated that FM needs to be constantly providing high level operational support for the core business via establishing rigid links the core business of the organisation allowing a balance between long term and short-term perspectives.

2.2.5.3 The Integrated FM Model -Alexander (1992) and Kincaid (1994)

Alexander (1992) produced a matrix (Table 5) that shows the added value that FM brings to the different management levels (strategic, tactical and operational). Alexander (2003) asserted that valued added management approach should be incorporated in the FM business that enables the business to achieve continuous improvement.

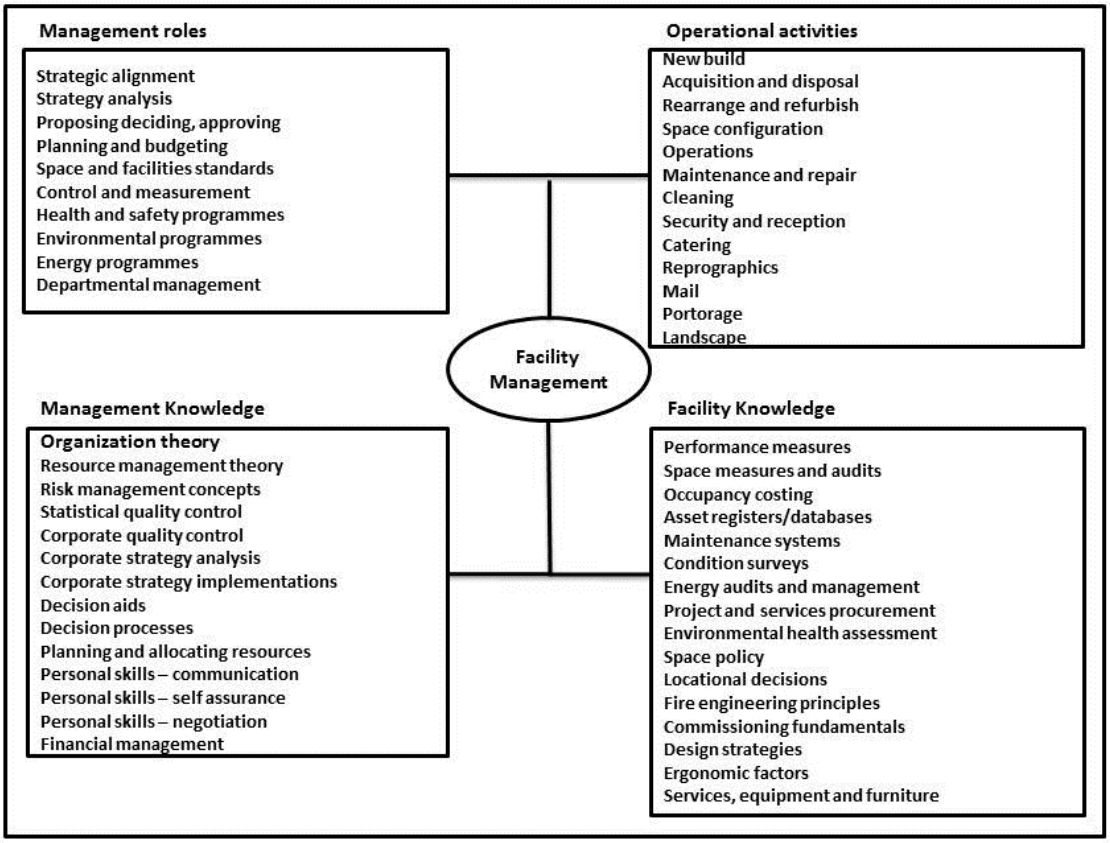
Table 5 Adding Value through FM

Strategic	Facilities management organisation Facilities management policy, planning and procedures Quality-managed facilities Purchasing policies ; Information management systems
Tactical	Property management ; Space management Environmental management ; Maintenance management
Operational	Improved service quality Improved communications with users Building management systems ; Labour management

Source: Alexander 2003

Further, Kincaid (1994) established a framework to explain with simple relationships the integrated facilities management. According to Kincaid (1994), the FM has a business support role which must link strategically, tactically and operationally. FM responsible should be equipped with the appropriate knowledge to carry out their integrated support services (Kurdi et al., 2011).

Figure 8 The Integrated FM in practice



Source: Kincaid, 1994

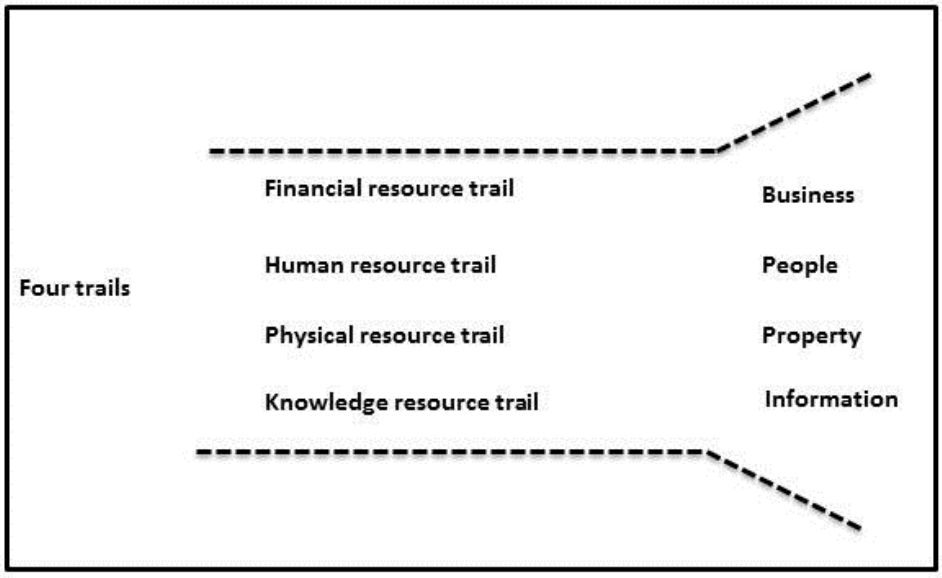
As shown in figure 8, the framework consisted of four major aspects: Management roles, Operational activities, Management knowledge and Facilities knowledge.

This frameworks salutes what Mintzberg (1980) depicted on management roles and requirements: Managers shall not spend their times in their classic roles of planning and monitoring but also in influencing their subordinates and improving their skills (Kurdi, 2011).

2.2.5.4 The Generic Trails to the Future Model - Nutt (2000)

In the meantime, Nutt (2000) focused on the strategic view of FM. He assured that the strategic objective of FM is to provide an added value, increasing consequently the outcomes, and to ensure a better infrastructure and logistic support to business. Nutt (2000) established the "Generic Trails to the Future" Model focused on business, people, property and information. Figure 9 below shows the generic trails that contribute to productivity, human effectiveness and facilitating business success (Nutt, 2000).

Figure 9 The Generic Four Trails to the Future



Source: Nutt (2000)

Figure 9 shows the four trails the financial, human, physical and the knowledge trails central to the FM function that would impact the FM future trends and opportunities.

Although the analysis provided by Nutt (2000) seems interesting especially with the powerful contributions to the future and how developments in technology and work patterns for instance will challenge the industry in the coming years, it is not clear whether those four trails establish truly a strategic role for FM or just a complex operational role with some longer term perspectives (Best et al., 2003).

2.2.6 Facilities Management Contributions

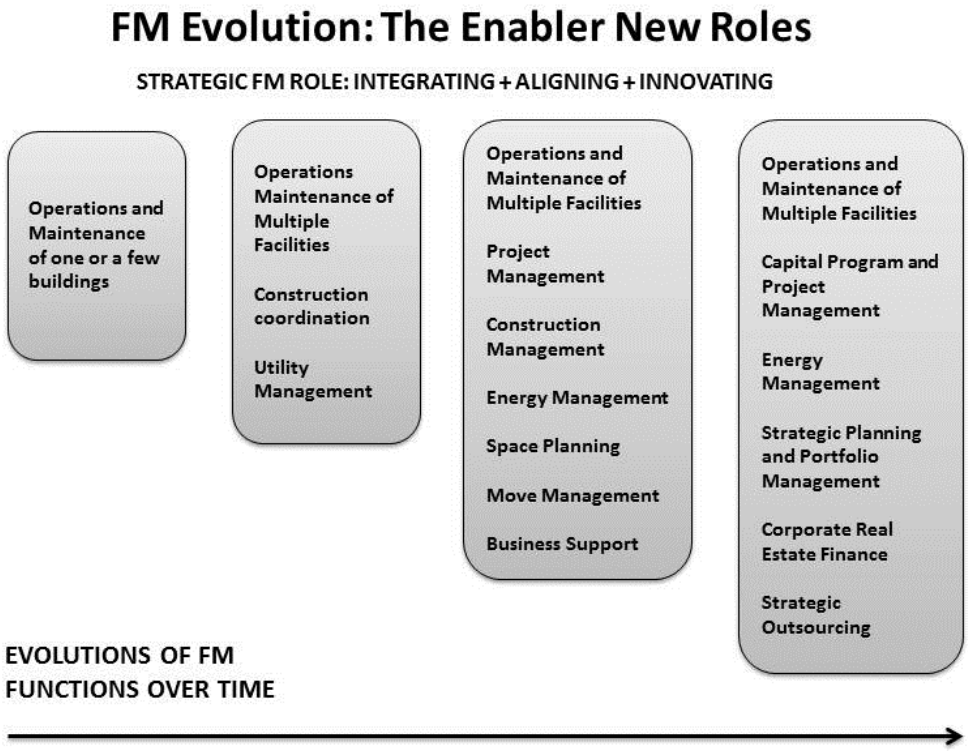
The evolution of the previous decades has transformed FM from just a service provider to a business enabler, crucial to the improvement of the business value of different types of organisations (Tranfield, 1995). Myeda (2003) suggested that the new role of FM is based on 3 approaches which are "integrating", "aligning" and "innovating". Figure 10 shows how FM functions have been upgraded over the years in value in the other industries or practitioners.

Grimshaw (2003) avowed that the FM capacities are stretched into six dimensions: technical or operational maintenance, economic or financial control, strategic or change

management, social (user interfacing), service (support services) and professional (advocacy).

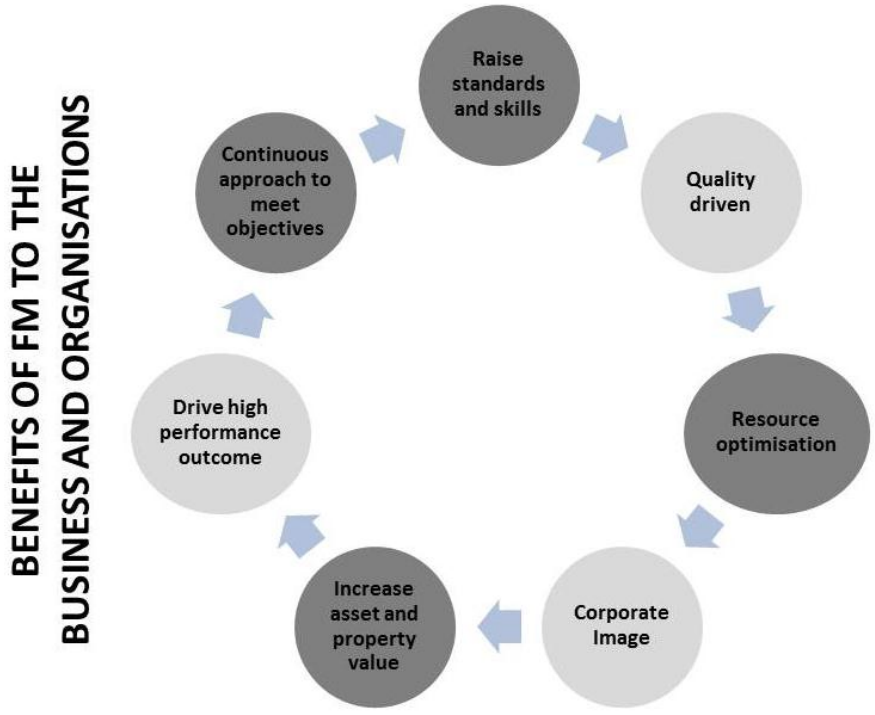
The FM is concerned with preserving the practical utility of the physical assets to ensure that they support the core activity and they provide a safe and cohesive working environment on a daily basis, with the productive and efficient resource utilization by controlling the economic vale and costs, with the planning of assets that enhance the client hierarchical improvement and diminish its risk, with aligning its offerings to the client image and corporate values, with the delivery of an excellent quality service, and with social responsibility towards workplace occupants. Figure 11 summarizes the key benefits of FM to the organisations.

Figure 10 FM: The Enabler New Roles



Source: Myeda, 2013

Figure 11 Benefits of FM to the Organisations



Source: Grimshaw (2003)

Going back to the Myeda's (2013) definition of the FM roles, the "integrating" role was presented in detailed in the models presented in the previous sections. They all showed how the FM is responsible of integrating the support services with the core services or department in the organisations.

The two others roles "aligning", in which the FM aligns its objectives with the organisation's strategy and goals, and "innovating", in which the FM plays a contributing factor the continuous improvement of the organisation, were presented here below.

2.2.6.1 Strategic Role of Facilities Management

The FM industry is today large and complex. The sector's definition continues to expand as practitioners require skill and knowledge, to include the management of an increasingly broad range of tangible assets, support services and people skills (Nut, 1999). It is a key service sector with a highly competitive market of in-house departments, specialist contractors, FM Vendors, large FM multi-service companies, FM consultants and institutions (Nik-Matt et al., 2011). The facilities management is focused on assisting organisations to achieve their strategic objectives and business goals, by managing and coordinating the physical facilities in order to provide effective workplace environment to employees (Abdul Wahab, 2006). Nutt (2000) sees the delivery of FM services based on two levels of strategic objective: the national and the local one. On the national level, the strategic objective of FM is to provide better infrastructure and logistic support to business of all kinds and across all sectors. At the local level, the effective and active management of facilities resources and services to respond to the right mix of needs knowing the capabilities constraints or costs (Myeda, 2013) is not simply related to reducing the operating expenses of a built facilities, but it spotlights on improving its efficiency as well (Amaratunga et al., 2000). BIFM (2007) reiterates Nutt's definition and underlines the strategic role of FM as a business enabler bridging the gap between the physical environment of the workplace and the tenants.

In the RICS Raising the Bar: Enhancing the Strategic Role of Facilities Management report, 'strategic' is defined as, "helping the business achieve competitive advantage by aligning real estate (space) and facilities services more closely with business imperatives, operational capabilities, and organisational performance."

Since, FM encompasses multiple activities under various disciplines, combining resources, it should be harmonised and provide a safe and efficient working atmosphere (Mohd-Noor and Pitt, 2009a). When FM is practiced properly, the company can create good plans that match corporate strategic plans, estimate projected capital expenditures and allow provisions for new space projects, increase employee productivity and minimize the unexpected costs (Amaratunga, 2001).

BIFM (2007) relayed the definition taken by Barret (2000) on the scope of FM aims and objectives into long-term (the strategic), medium (the tactical) and short (operational) level respectively, as shown in table 6. This tasks' categorization shows the great impact of FM on decision making processes as it involves planning decision and having direct communication with higher management, and establishing effective purchase and contract strategies (Kamarazaly, 2007). On tactical level, the FM is responsible of monitoring the compliance with laws was thought according to the importance and impact on the client's organisations.

Table 6 The three levels of FM implementation

Strategic Level To achieve the objectives of the organisation at a corporate level in the long term through: • Defining the overall FM • Policymaking, elaborating guidelines for space, assets, processes and services • Active input and response at corporate level • Initiating risk analysis and providing the direction to adapt to changes in the organisation • Initiating and monitoring KPIs • Managing the impact of facilities on the primary activities, external environment and community • Maintaining relations with authorities, landlords and tenants, strategic associations and partners
Tactical Level To implement the strategic objectives at a business unit level in the medium term through: ▪ Implementing and monitoring guidelines in order to follow strategies ▪ Developing budget plans ▪ Translating business objectives to the operational level ▪ Defining and interpreting KPIs (performance, quality, risk and value) ▪ Monitoring compliance with laws and regulations ▪ Managing projects, processes and agreements ▪ Managing the FM team ▪ Optimizing the use of resources ▪ Interpreting, adapting to and reporting changes ▪ Communicating with internal or external service providers at a tactical level
Operational Level To create the needed environment for the end users on a day-to-day basis through: • Delivering services • Monitoring and checking the service delivery processes • Monitoring the service providers • Receiving requests for services via a help desk or service line • Collecting data for performance evaluations, feedback and demands from end • users • Reporting to the tactical level • Communicating with internal or external service providers at an operational level

Source: BIFM, 2007

Then and Akhlaghi (1992) provided a detailed matrix for classifying tasks, as shown in table 7. While the rows reflect the strategic, tactical and operational management levels, the columns replicate the strategic involvement of the FM from a project tasks and duties to the executive responsibilities role. In other terms, "procurement policy" comes under the tactical level and to be implemented and assessed further by the executives and further assessed by the executives (Then, 1996).

Table 7 Classification of FM tasks

	Executive Responsibilities	**Management roles**	**Project tasks**
Strategic	▪ Mission statement ▪ Business Plan	▪ Premises strategy ▪ Facility Master planning ▪ Information Technology Strategy	▪ Strategic studies ▪ Estate utilization ▪ Corporate standards
Tactical	▪ Corporate Structure ▪ Procurement Policy	▪ Planning Change ▪ Setting standards ▪ Resource Management ▪ Budget Management ▪ Database Control	▪ Guideline documents ▪ Project Programmed ▪ FM Job description ▪ Database structure
Operational	▪ Service Delivery ▪ Quality Control	▪ Managing shared facilities ▪ Facilities operations ▪ Implementation ▪ Audits ▪ Emergencies	▪ Maintenance procurement ▪ Refurbishment ▪ Inventories

Source*:* Then and Akhlaghi (1992), (Transfield and Akhlagi, 1995)

The FM responsibilities encompass taking strategic decisions in managing support functions and operational decisions to manage and achieve an optimum business solution (Barret and Baldry, 2004). Those decisions, yet simple, but cannot be effectively made without setting on the tactical level the policies, procedures and services, procurement procedures, human resources management, training and development, alongside with business relationships (Mohd-Noor and Pitt, 2009a).

"Despite growing recognition that workplace management is becoming both more complex and more central to business strategy, facilities management is still not widely

recognized as a strategic resource area in the same way as some other corporate functions", highlighted the IFMA – RICS report "Raising the Bar 3- 2017". IFMA and RICS emphasized that the main challenges facing the industry at this moment are not just limited to cost-reduction but a redefinition of the FM Mission in identifying explicit strategies, organisational structure options, skill requirements, and in their time allocation to day-to day activities which constitutes more than 50% of the Head of FM time. Only 30% of their times are given to strategic planning (IFMA, 2017) in an era where the FM must align with the other corporate peers such as Finance, HR, and other primary business units to outline a workplace strategy compatible with the organisation's and business unit's vision.

Subsequently, many researches demonstrated that the FM aims is not only the optimization of the running cost of facilities and buildings, but the efficiency improvement and ensuring the suitable management of space, processes, people and other related assets. Hence, the goals and objectives of the organisation can be met with the best combination of efficiency, cost and quality (Kamarazaly, 2007).

2.2.6.2 Facilities Management Innovation in Service Delivery

Facilities Management, being one of the fastest growing business industries, continues to expand (Barrett and Baldry, 2003) and to gain greater recognition as a strategic unit having a significant influence on organisational success and goal achievement (Pathirage et al., 2006). The FM corporate strategies designed for competitiveness, customer flexibility and continuous improvement of service delivery have required a rethink of all processes and restructuring (Alexander, 2003) which in turn has led to innovative approach to support the business and improve their performance. The relevance and significance of innovations were not just limited to the emergence of new products and processes, but also extend to the environment and facilities sustainability plans, project labors and employees (Alexander, 1999).

The role of innovative management in FM is not restricted to the production of innovative solutions, but it is more about the provision of a creative environment in which solutions can be conceived, developed and applied (Goyal and Pitt, 2007). Organisations cannot be qualified as innovative if they are not clearly and coherently managed by creative people (Mohd-Noor and Pitt, 2009). Those people will ensure the development of a creative

environment in which solutions will continuously be conceived, adopted and implemented within all levels (Price and Akhlagi, 1999).

A clear link is proved between innovation and high-performing workplaces where good managers inspire their employees and create a workplace culture in which new ideas are encouraged and rewarded (DTI, 2003).

Since 2000s, the technology innovation has remodelled the FM industry through CAFM systems which enable the FM companies a better and efficient management through dashboards for monitoring real time work orders and KPIs at all buildings in one portfolio, or monitoring, for instance, the foot traffic in restrooms to schedule restroom visits or using GPS and street traffic to schedule mobile maintenance plans, etc. (Prodgers, 2014). The mobile data solutions invaded the markets in 2010s to improve the FM provider's flexibility and responsiveness. Today, FM companies are still seeking new technologies and innovative ways to leverage on the huge big data analytics collected on their systems.

Innovation, quality and performance measurement has been twinned in organisation seeking continuous improvement. Mudrak et al. (2004) mentioned that Performance measures are essential to monitor the process of innovation related to time, cost and quality and to be differentiated within short term and long term strategies.

2.2.7 The FM practices in the United Arab Emirates

The facilities management market in the Middle East countries is booming with growing public and private sector demand for FM solutions that are both global and integrated (Ali, 2014). The FM industry in the UAE alone would be growing on average at 9% during the 2016 - 2021 to cope with the upcoming projects that shall be accompanying the Dubai Expo 2020 (Tesci report, 2017). Along with this evolution, customer expectations are increasing to include more value-added FM services such as health and safety and environment initiatives, energy conservation initiatives (Redlein et al., 2014) while accepting a transfer of risk to their accounts. To this end, FM suppliers are turning from single or bundled service providers to strategic partners who shall have the capability to provide excellent service delivery across a wide menu of services as well as the flexibility to accompany the customer in its expansion (Ali, 2014).

2.2.7.1 Middle East Facility Management Association (MEFMA)

MEFMA is a non-profit professional organisation, formed under The Dubai Association Centre (DAC) which has been established last decade by the Dubai Chamber of Commerce and Industry, Dubai Business Events (part of Department for Tourism and Commerce Marketing) and the Dubai World Trade Centre.

MEFMA aims at unifying the facilities management industry in the Middle East, by conducting research, providing educational programs and assisting corporate organisations in creating sustainable facilities management strategies. Networking, education, knowledge sharing, thought leadership, legislative governance and B2B events are all significant components of strategic FM to be promoted, supported and implemented by MEFMA and its Members.

The establishment of such institutions promotes the standardization of the FM activity in the local and regional market and consequently accelerates the organisational maturity of the service providers and their development.

2.2.7.2 Opportunities

The facilities management industry in the UAE precisely benefits from the economic and political stable condition of the country comparing to a boiling regional context (Credo, 2013). The market is still relatively in its early stages when compared to other developed regions such as Europe and North America, and far behind in terms of best practices in facilities management especially specialization in niche technical services, energy life cycle management and applying health and safety practices (MEFMA, 2011). Hence, the FM market faces a huge opportunity of growth to towards its maturity and saturation.

Backed by a decade of robust growth, the UAE's facilities management industry is now well-positioned to support the nation's ambitions for a sustainable built environment (Affix, 2017). It is expected to grow annually at 8.51% between 2016 and 2021 as per Tesci Research Report (2016). The tremendous boost of new mega projects, residential and commercial, has opened wide the growth opportunity for the FM sector (FM Expo report, 2015). However, this expected growth won't be an easy challenge as the building owners are becoming highly demanding due to inflationary pressures. FM contracts are

becoming more integrated, more metric-based, and crucially, longer in duration. The combined effect of these improvements is better service for customers and of course, improved cost-efficiencies for all parties.

On other hand, the regulations and the tough requirements imposed by the local authorities in maintaining their new and old buildings gave birth of new and multiple FM companies. Moreover, the urbanisation plans carried out by the government in rural areas secure the facilities management market yet not mature or saturated a potential growth over the upcoming decade (MEFMA 2011).

2.2.7.3 FM Main Challenges and Intrinsic Characteristics

The UAE market faces general challenges intrinsic to the FM industry worldwide that swing around three main pillars of any credible service industry: the quality of services provided *vs.* the efficient cost reflected in the best resource management, the customer acquisitions and retention and the technology exploitation. The main challenges facing the UAE FM market emanate from a lack of recognition at first place, education and training needs and skills required, slow career development, the absence of information standardization, the inaccurate performance benchmarking, cost value versus value in service procurement, and the corporate and community contribution of FM (Ballesty, 2007).

Starting with the resource management, the FM market suffer practically from an unceasing threat of labour productivity: the lack of training sessions for labours, lack of eating and relaxation places, lack good transportation, and lack of recognition critically affect labour productivity (Enshassi et al., 2007). Added to that the lack of job security which characterizes the UAE Labour Law, the poor social relationship, the delays in mobilization and deployment due to insufficient management resources, the unsafe working conditions, all leads to increased de-motivation and absenteeism of employees.
The adverse weather' condition can also lead to significant loss of productivity. However, weather conditions vary between geographical locations and time. There is a significant impact of weather in UAE during summers (Singh, 2010). As a result, the productivity levels fall drastically, specifically for the workers performing activities related to infrastructure development, where in they are exposed to extreme weather. The

municipalities solved this issue by inaugurating a special verdict for labour timings within summer season.

Besides the technical skills required for providing facilities services, the firms also need to have strong leadership to accommodate widely and develop service-related strategies that are demanded by large clients as the leadership style impact significantly the organisational performance and productivity (IFMA, 2014). The facilities managers need to be prepared for leading, influencing, motivating and managing people across all the levels in the organisation (Otote, 2008; Mohebbi, 2013). Ineffective leaders will develop ineffective strategies and make unprofessional decisions, which can result in lack of motivation. Organisations having poor managers always lack vision, good communication skills, and adequate understanding of business effective strategies will perform below expectations (Djellal and Gallouj, 2008). On the other hand, leaders that involve and engage employees in the operational activities of company build their morale and enhance their productivity. Appelbaum et al. (2005) asserted that at all levels of organisation, the managers and staff supervisors need to have a supportive communicative process that create direct flow of information and an atmosphere which enhances overall productivity. The lack of local expertise, specialists and managerial leaders who can balance knowledge diffusion and skills enhancement (Ismail, 2007) is a serious challenge in the UAE as it is linked to the low service quality (Ruslan, 2007).

The quality cost issue is heavily affected by the late implementation of FM in some properties. FM companies are highlighting in every occasion the importance of the FM design review to be executed at the early stage of building or project conception. The FM design review or the implementation of a sustainable FM planning would allow the property to save tremendous budget on assets repairing or replacement.

On the other side, the customers are looking more for a strategic partner, rather than a supplier, that is going to deliver best-in-class FM allowing them to leverage the value of their facilities assets. Their explicit demands are tangible: “clean”, “100% uptime” and “allow me to focus on my core business”. Implicitly, they require a high level of reliability, convenience, responsiveness and cost-effectiveness.

The rapid pace of the advancement of technology in the services aims no doubt at facilitate the FM companies' journeys and improve the quality of their services as it enables more thorough and faster service delivery leading to increase overall performance of the organisation (Teicholz, 2012). Emerging technologies solutions across the FM discipline offers the facilities management companies the opportunity to deliver real-time data and robust analytics to key business stakeholders (IFMA, 2015). The advancements in CMMS tools supported increased measurements and improved FM operations. Mobiles data solutions allowing maintenance validation with photo submission, GPS location validation, real time stamping the work order supporting, bar code scanning and a work order attached to the equipment, customer satisfaction surveys, assets life cycle management, CAPEX budgeting and benchmarking are influencing positively the FM company by shortening their processes and improving their client experience. However, it is essential for facilities managers to have an understanding and interest in information technology and its related issues in order to provide effective services and to resolve any IT related issues quickly. Often facilities managers are required to implement, install and operate a number of technologies without having any prior experience or interest in technology (Teicholz, 2012, 13).

Last but not least, the real challenge of FM lies in the lack of standards that can be used to measure the quality level and performance of both traditional and integrated FM applied by building or property management companies (Moore and Finch, 2004). The slow pace of regulating the FM standards in the market is another factor that requires immediate action. A good level of planning for FM may help in standardizing the future maintenance allocation required and planning for the strategic maintenance approach (Mustapha and Adnan, 2008). Performance measurement systems have been criticized in the literature and in the practice for not being neither dynamic nor responsive breaking the alignment between strategic intent and operational measurement. Those challenges are identified thoroughly in the literature review as well as the gaps to be filled in order to improve the overall performance of the Facilities Management (FM) sector. The practical relevance of FM to organisations in the UAE is currently recognized: the attraction of FM is becoming increasingly common, as forward-looking organisations are beginning to realize FM as a function with clearly defined objectives and as a strategic and commercially-oriented discipline (Stranack et al., 2013). However, the FM is still seen as

an expensive overhead that doesn't really generate income for most companies. Facing a very tight competitive tendering process in acquiring new businesses, the FM industry are faced to a big challenge: perform efficiently, reduce their costs and maximize their profit margins on projects. Hence, the FM organisations started implementing performance management system, namely benchmarking and the Balanced Scorecard to evaluate, monitor, and manage their performance.

Locally, the FM in the UAE market receive increased pressure from the government that keep in issuing new laws and targets for the FM companies to follow. Since the UAE Government has promised to reduce the energy consumption of the new large building energy consumption by up to 30% by 2030, a new scope of works has been provided for FM Managers and real estate companies requiring sustainable solutions in design build and operate models.

Today, FM in UAE still focuses more on the operational level and little importance is given to strategic level, best practices, staff capabilities and other areas that support the organisation's core business. Another hindering factor is the absence of guidelines and FM strategic framework in the UAE to contribute the overall business needs improvements (Ali, 2014).

2.2.8 Section Summary

In this part, the study explored the facilities management industry. It starts by presenting the diverse definitions given to this discipline. This discipline has witnessed a tremendous growth and evolved in the last few decades from a service industry providing building maintenance (hard and soft services) to a large panoply of services including basic roles such as real estate, landlord activities, facilities planning, premises services, and employees support services, and strategic roles such as information technology, programming, planning and management, operations administration business risk assessment, contract procurement, information technology services, etc..

The FM scope is then not limited to the daily operation but is involved with strategic aspects which define the FM as a total management of facilities and people related services.

After that, this section discussed about the various business models that outlined the FM function and the diverse contract models. The FM was progressively expanding from being an in-house entity to an integrated FM solution provided by an expert service provider. The FM services evolved from single to bundled services then to integrated services where the organisation outsource FM service provider to undertake all the non – core business support services (Amartaunga and Baldry, 2000).

Indeed, the majority of the FM business models converged onto the idea that the efficiency of any organisation is linked to the physical environment in which it operates and that the environment can be enhanced to increase organisational improvement (Grimshaw and Keeffe, 1993). The FM is then essential to maintain the best fit operational environment to meet the strategic needs of an organisation (Kurdi, 2011).

Becker (1990) asserted that the FM is not only about coordinating efforts in planning and managing buildings, systems equipment's and furniture's but coordinating all the factors of his frameworks to enhance organisation's competence within rapidly changing world. Barret (1996) draw on previous researches and developed the Generic FM model displaying the different linkages and interactions of the FM with other departments within the organisations and with the external environment.

Alexander (1992) and Kincaid (1994) worked on the integrated FM model which depicts the FM added value on each management level. Kincaid added that the management and the facilities knowledge are essential conditions for the FM to achieve its integrated added value and support services.

While to Barrett (1995, 2000) Alexander (1992) and Kincaid (1994) analysed the FM function into two level of operational and strategic management, and asserted that the current and future business environment in which the organisation interacts as shown are determined by the interactions and the balance between short and long-term level (strategic and operational), Nutt (2000) focuses on the strategic view and identified 4 business trails and listed their success factors which would allow the growth of the facilities management industry.

Numerous researchers affirmed the important role of the FM in the organisational success and demonstrated how the FM is a business enabler bridging the between the physical environment of the workplace and the different stakeholders (Myeda et al., 2011). It shall

ensure that the services are well integrated in the organisation, that the FM decisions are well aligned with the organisation's strategy and that they encourage the innovation towards developing new services, products or even strategies enhancing the quality of service delivery.

This section ended with a brief snapshot on the FM practices in the UAE market. The literature review, although scarce, has shown that FM industry in the United Arab Emirates is still immature and in need of a step forward to be as competitive as other FM industries globally despite the booming of the last decade.

A review of the practitioners reports, initiatives and the few academic articles on the topic has allowed the researchers to identify the opportunities that represent this market to the services providers and to the industry regionally and globally, as well as some challenges that are intrinsic to the FM profession and applicable as well in the local market.

In the following section, an extensive literature review of the performance measurement models and frameworks that emerged in the last four decades are described, analysed and deliberated.

2.3 General business performance measurement

2.3.1 Overview

This section reviews general business performance measurement models and systems and concludes with a discussion on gaps in knowledge. To do so, publications were identified, classified, reviewed and analysed. This section starts by presenting the need expressed throughout the history of performance measurement systems (PMS) and their evolution to respond to a continuous changing business context. After defining the performance measurement and concept, the study draws the essential characteristics of a successful PMS, the types and criteria of performance measures to be considered as well as the barriers and challenges identified in the literature in the design, development and implementation of a PMS. Subsequently, it continues in analysing the performance measurement approaches and analysing how linking performance measurement (PM) to strategy and company vision was proved to be the crucial factor of a long-term success of performance management. The performance management field witnessed not only a shift

from financial key performance indicators to multi-dimensional or balanced performance frameworks, but also an expansion of perspectives in attempt to cover all organisation's environments needs and requirements. Some key existent models was presented and analysed to conclude on their strengths and weaknesses as well as the apparent gaps in knowledge.

2.3.2 General Need for an Organisational Performance Assessment

Along with the dynamic change of the business markets stamped with the globalization, the diversification, a fierce competition and technological innovations, the performance measurement has been increasingly discussed over (Ladrum et al, 2000). It has been perceived as the process of determining how successful organisations were in attaining their objectives as it acts as an early warning system where it indicates the operational effectiveness (Neely, 1998; Simoes et al, 2011), the problems and areas of continuous improvement (Myeda, 2013; Parida and Kumar, 2006; Martinez, 2005). Modern organisations are till now under constant pressure from shareholders to increase shareholder value, reduce cost, increase employees' productivity and enhance customer experience (Al Raisi, 2011). The PM is then essential to every organisation as it provides feedback; builds understanding and two-way communication encouraging motivation (Myeda, 2013).

So, although the need for assessment for work quality and performance has existed throughout man's history (Hamel and Prahalad, 1994) with the famous sayings such as "You get what you measure", "People perform the way they are measured" (David and Joseph, 2014) , organisations and management practitioners have witnessed, in the last four decades, a speedy academic production of performance management models (Pintea, 2013) and (Taticchi, 2008): from financial and traditional accounting based frameworks (Du Pont, 1903) to multi–criteria models such as the Performance Measurement Matrix (Keegan et al. 1989), the Performance SMART Pyramid (Lynch and Cross, 1991), Results and Determinants Matrix (Fitzgerald et al. 1991), Balanced Scorecard (Kaplan and Norton 1992), the Performance Prism developed at Cambridge University (Neely et al. 1995, 2001 and 2002), business excellence and quality models (EFQM, 2007), capability maturity models and many others (Meng and Minogue, 2011). Although these models come from different backgrounds, they have achieved considerable success in the improvement process of organisations' performance (Atkinson, 2006).

Many researchers have proved that performance measurement plays a crucial role in monitoring the organisational control (Nani et al., 1990) and ensuring implementation of the overall organisation's strategy and goals (Fitzgerald et al, 1991). Some attempted to define the performance measurement system via focusing on its importance, whereas some authors stressed on its functionality and denoted the need for measurement control and planning, change management, business units' resource utilization and motivation (Sinclair and Zairi, 1995a), in improving organisational processes and information flux within the company (Park et al., 1996). Many others such as Oakland (1993) and Neely (1999) identified commonalities between business strategy, performance monitoring, organisational behavior and positioning, future planning and tracking improvements efforts (Neely, 1998). They consent that "strategies are realized through consistency of decision making and action" which may be reinforced by performance tracking methods.

Abu-Suleiman et al. (2011) cited by (David and Joseph, 2014) summarized the importance of performance management system as follows:

Performance measures drive actions in two ways: Incorporating monitored measures in the organisation help the management to get high visibility and commitment as employees will strive to achieve high performance with respect to these measures. Then, measured metrics drive organisational actions by identifying areas of improvement. Once poor area is identified, managers can take corrective action to address such issues.

Performance measures provide a framework for decision making as they made a baseline to evaluate alternative solutions.

They also provide closed loop control: an effective enterprise performance management system allows proper monitoring of business process. The feedback is used to compare actual progress to planned one and allow benchmarking against industry best practices and to identify improvement opportunities.

Additionally, Meyer (2002) defines seven purposes of performance measurement that takes place within the different levels of the companies. Performance measurement enables companies to have a two directions vision: look back and evaluate the past activities and look ahead and prepare for the forthcoming performance. "Motivate and compensate, on the other hand are the purposes for the lower levels of the company. In larger and more complicated firms, measures are also expected "to roll up from the

bottom to the top of the organisation, to cascade down from top to bottom, and to facilitate performance comparisons across business and functional units" (David and Joseph, 2014).

Last but not least, the emergence of quality awards in the 1980s-1990s and then their popularity and spread across the globe encouraged organisations to adopt PM in order to gain recognition from their stakeholders (shareholders, customers, employees, and community). A number of researchers have also been motivated to study the awards to explore the similarities and differences along with the cost-benefit analysis. Bohoris (1995) has compared the Japanese, European and American quality awards and discusses their significance to business and found that the European and American ones are more comprehensive as they include operational results added to the other examination criteria such as human resource management, customer satisfaction, and impact on society. Another study conducted by the Industrial and Systems Engineering Department of National University of Singapore, (ISE News, 1998) has compared the National Quality Awards (NQA) from various countries from Africa, North America, Europe, Asia, Latin American, and the Middle East. As a matter of fact, almost all studies conducted during the 2000s on the diverse quality awards practices in the world found that the two points strongly looked at are leadership and human resources management. Companies, striving to make difference and to differentiate themselves from their peers, made from local, regional and international quality award a necessity for their business success and survival (Chandramohan, 2007).

2.3.3 Performance Measurement Concept

Lately, performance measurement topic has become popular in management literature; although it was often discussed, it was rarely defined (Neely et al, 2005).

Despite the many multiple definitions standpoints given by researchers, performance measurement remains a wide topic. Whereas some researchers define the performance measurement as a metric used to quantify the effectiveness and the efficiency of an action (Neely et al., 1994; Hronec, 1993; Ghalayini and Noble, 1996), others see in it a monitoring and control process. Hronec (1993) enlarged Neely's definition when he esteemed performance measures as critical signs of the organisation's wellbeing, which quantify how well the activities within a process achieve a defined target. Ghalayini and Noble (1996) supported Hronec by defining a performance system as a "tool for

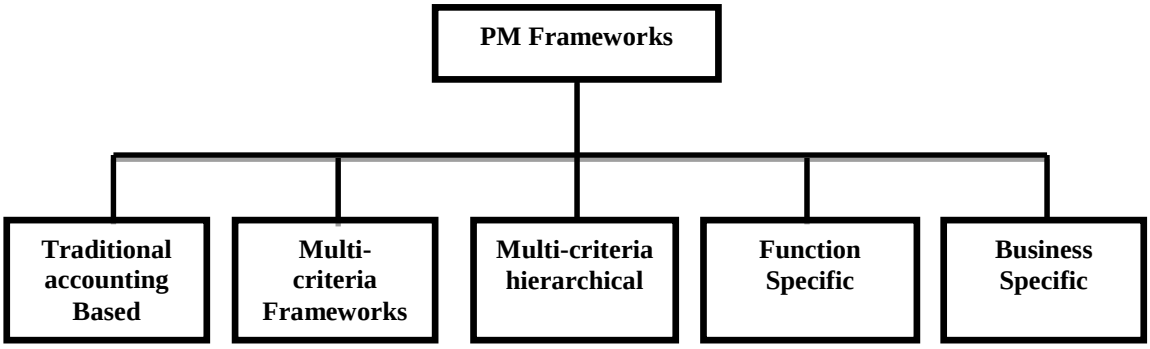
balancing several measures within several levels. Many others considered the performance measurement as a mean of monitoring organisational control. The performance measurement is the process that enables the organisation to pursue its strategies and achieve its objectives (Nani et al., 1990; Talley, 1991; Edson 1998). For some it is a " vital management tool" enabling planning, enhancing change management, improving the communication, and incorporating a continuous improvement culture within the organisations (Sinclair and Zairi, 1995a; 1995b).

Whether it's a metric to quantify or process to monitor, researchers agreed on the mystery, the sensitivity and the complexity of the performance measurement framework which is accountable of the organisation's improvement. Sink (1991) admitted that measuring performance is a "complex, challenging, difficult, essential, and misused" function.

2.3.4 Performance Measurement Evolution throughout History

Over the years, some interesting performance measurement frameworks have been developed. Although researchers consider that the performance measurement systems started around the 1860s and 1870s, they agree to consider the 1980's as the period of turning point in the performance measurement history, where before 1980, all the performance models were financial and accounting based ones (Amaratunga et al., 2001; Parida and Kumar, 2006). They were first developed based on simple and straight-forward objectives that were to monitor and maintain the organisational processes (Al-Haddad and Kotnour, 2015). All the way through the history, the performance measurement (PM) models or frameworks have been divided into financial or traditional accounting based frameworks such as Du Pont Model (1903) cited by Glavinich (2002), and multi-criteria frameworks (Figure 12). According to Ghalayini and Noble (1996), the literature pertaining to PM evolved through two stages. The first stage, known as *cost* ***accounting orientation*** stage, started in late 1880s. Managers served those financial tools to evaluate the relevant costs of operation. The second stage post 1980 is categorized by a ***balanced an integrated view*** of PM (Augusto et al., 2005; Gomes et al., 2004). At that time, the traditional financial approach was criticized for short-term measures, backward-looking, internally focused and failing to measure and to integrate all the factors critical to the business success (Hayes and Garvin, 1982; Kaplan, 1983, 1984; Anderson and McAdam 2004; Myeda, 2013).

Figure 12 PM Frameworks Categorization



Source: Parida and Kumar, 2014

In figure 12, Parida and Kumar (2014) categorize the PM frameworks into multi criteria frameworks for those that have both financial and non-financial measures, multi criteria hierarchical for those that have strategic, tactical and operational perspectives, function specific for those that are specially design for a specific business unit such as the Human resources performance measurement systems, and the business ones for the performance measurement systems that are specially designed to an industry such as infrastructure, construction or facilities management.

In the 1990s, the emergence of non-financial or qualitative indicators specifically focused on process, structure, and change has transformed the way in which businesses perceive performance (Tucker and Pitt, 2009). The attention of performance measurement shifted to quality and consumer satisfaction. A wider conceptualization of business performance has been emphasized on non-financial indicators (operational performance) in addition to traditional business performance indicators (Venkatraman and Ramanujam, 1986). Amaratunga and Baldry (2003) summarized the shortcomings of the traditional performance measurement as follows: criticism of traditional management control (Brown and Laverick 1994; Letza, 1996, Neely 1998); the need to represent non-financial measures (Olve et al. 1999, Ernst and Young 1998); the lack of prescription on how to implement those measures (Olve et al. 1999, McFadzean 1995); lack of strategic focus (Hally 1994). Performance measurement was developed then to follow a balanced approach taking into account all the critics made upon the financial measurement system.

Since then, various authors have suggested different multi-criteria systems to manage organisational performance among which the following: Performance Measurement Matrix (Keegan et al. 1989) and (Sink and Tuttle, 1989), Performance / SMART Pyramid (Lynch and Cross 1991), Results and Determinants Matrix (Fitzgerald et al. 1991),

Balanced Scorecard (Kaplan and Norton 1992), Measurement of Productivity (Cole, 1993), the Input-Processes-Outputs-Outcomes Framework (Brown, 1996), the Performance Measurement Process developed at Cambridge University (Neely et al. 1995), the Integrated PM System (Bititci, 1997), the Integrated Dynamic PM (Ghalayini et al., 1997), the Performance Prism (Neely et al. 2001, 2002), the European Foundation for Quality Management (EFQM) in 2003, and the Multi-criteria hierarchical framework for MPM (Parida and Chattopadhyay, 2007).

Table 8 Performance Measurements Frameworks

	Emphasis	*Advantages*	*Disadvantages*
Balanced Scorecard (Kaplan and Norton, 1992	A balance between the use of financial and non-financial performance measures to achieve strategic alignment designed for medium to large company context	Good average of the dimensions of performance, giving a new concept of having tangible and intangible measures	Provides no mechanism for maintaining the relevance of defined measures. Lack of integration between the top level, strategic level and operational level, giving a potential problem in the execution of strategies. Fails to specify a user-cantered development process
Performance Pyramid (Lynch and Cross, 1991)	Useful for describing how objectives are communicated down to the operational level and how measures are conveyed back up to higher levels.	Provides and explicit link between strategy and operations, and also encourages a user-cantered design	Fails to specify, in any detail, either the form of the measurement or the process for developing them.
Results and Determinants Matrix (Fitzgerald et al., 1991)	Considers leading and lagging performance measures and targets	Specifies what performance measures should look like and provides a useful development process	Does not include customers or human resources as dimensions of performance and cannot give a truly balanced view of performance
Integrated Dynamic PM (Ghalayini et al., 1997)	Built on several different concepts to develop the system	Explicit process for maintenance and for ensuring fast and accurate feedback	Several different tools are potentially complicated to understand and use fails to provide the explicit process for developing the PMS and is inadequate with respect to the human resource dimension.
Integrated PM System (Bititci et al., 1997)	Links between performance measures and strategic plans and/or critical success factors of the business	Covers many of the criteria required for a comprehensive PMS	Fails to provide a structured process that specifies objectives and timescales for development and implementation
The Cambridge PM (Neely et al., 1996, 2003	Offers explicit guidance on how to develop and implement a strategic PMS effectively	Covers a comprehensive process for the development of a strategic PMS	Development of operational measures is described as an optional process
Integrated Measurement Model (Oliver and Palmer, 1998)	Focuses on various aspects from customer and human aspects to the quality, flexibility, timeliness and finance factors	Comprehensive approach as it defines the dimensions of performance and provides a mechanism for designing the measures	Lack of structured process for overall development
Consistent PMS (Flapper et al., 1996)	Defines performance indicators and the relationship between those indicators and sets target values for them	Gives a very detailed process for developing and implementing PMS	No insight of the relationship between performance Objectives.

Source: Myeda, 2013

2.3.5 The Development of Performance Measurement Model/ System

As mentioned in 2.3.3, the performance measurement may be defined as the process of quantifying the effectiveness and the efficiency of an action (Neely et al., 1995; Parida and Kumar, 2006). It was first developed based on simple yet straightforward objectives that were to monitor and maintain the organisational processes aiming to achieve the goals and objectives of the organisations (Nani et al., 1990). In other words, it symbolizes the technique by which organisations manage its performance. Thus, it ought to be in line with the organisation's corporate and practical objectives and goals (Bititci et al., 1997). The PM is moreover seen as the way toward deciding how effective organisations or people have been in achieving their strategies (Kagioglou et al., 2001). An operational PMS additionally acts like an early-warning alarm where it gives a sign for issues and zones for constant change (Parida and Kumar, 2006; Martinez, 2005; Baldwin et al., 2001).

2.3.6 Approaches of Performance Measurement Model

Performance measurement and management (PMM) systems have been posing serious challenges to companies in terms of meeting multiple stakeholder objectives for several decades (Globerson 1985). Often, it was so complicated for the organisations to meet all objectives, especially those described as conflicting such as improving quality and reducing costs at the same time for example (Vernadat et al., 2013).

Major growth in the PMM discipline started in the late 1970s with researcher's criticism of with traditional backward-looking accounting systems (Nudurupati et al. 2011). Traditionally, accounting-based or financially based performance measures were internally focused and more concerned with local departmental performance than with the overall one (Bourne and Neely, 2003). Many researchers and practitioners realized that, in a continuously evolving context where the organisations are gaining complexity in structure and facing tough competitiveness, it was no longer interesting to use sole criteria of performance or success assessment (Kennerly and Neely, 2002). From that point forward, the performance measurement systems approach turned into a multi-dimensional approach that encompasses a broader view of performance measures,

flexibility in new measures such as customer satisfaction, quality, responsiveness, reactivity, even innovation etc. (Johnson and Kaplan 1987).

Numerous theoretical multidimensional frameworks for PM design were developed in the management literature. In short, each of the PMS approaches has both relative strengths and weaknesses. A thorough review and analysis of the existing performance measurement and management system (PMS) approaches and methods disclose that none can globally handle the relevant established performance concepts, i.e. multi-dimensionality, multiple stakeholder perspective, and performance at multiple levels. In addition, risk management is not part of any PMS. Furthermore, there is little guidance for the way the performance measures shall be chosen and implemented (Shah et al. 2012).

2.3.7 A successful Effective Performance Measurement Model

Performance Management Models (labelled "systems" once implemented in organisations) are distinguished by their practical use, their long term visibility, their link to the organisation's strategy and objectives (Tangen, 2003). Previously, a lot of PMS lost their popularity among practitioners once implemented for the big number of performance measures that they delineate which require a considerable investment in training, time and effort in feeding up the system with the data collected (Martinez, 2005). Managers and employees were not showing commitment for the rigidity and non-flexibility of the system. In designing a PMS framework, goals, design and management are important aspect to be taken into consideration (Wordsworth, 2001).

A comprehensive and successful PMS ought to consist of both objective and subjective performance measures to ensure from one side that no bias is occurred by any party and to enrich analysis from the other side with various aspects that objective measures cannot attain (White, 1996).

Another criterion of PMS success is its simplicity to be understood by employees who will be operating the processes, involved and subsequently influence the PMS implementation and the performance improvement of the company (Sinclair and Zairi, 1996). Controversially, Bourne et al. (2000) deny the importance of employee's

involvement impact as they suggest that a good PMS process shall be automated to ensure best results.

Tangen (2002) proposed few basic criteria required for performance measures to be effective: They must be derived from strategic objectives, must provide timely and accurate feedback from short and long term perspective, shall be easy to understand and to undertake, and limited in number so that they cover the overall picture (financial and operational) in a concise way. In parallel, Wordsworth (2001) asserted that the linking of performance measures in relation to the strategic objectives, and the vertical and cross functional alignment of the measures into different levels of hierarchies are key design features of a good quality PMS.

Other success factor for a PMS is to cover proper performance measures to the organisation focused on its targets and strategy (Myeda and Pitt, 2012). Throughout the last 4 decades, a lot of researchers had advised and developed performance measurement models. Supporters of a particular model or framework are eager to feature the advantage of that measurement, but are much more hesitant to discuss barriers or limitations of the implementation.

2.3.8 Performance Measures Criteria

As stated above, performance measures shall be relevant, clearly defined, and simple to understand, easy to put into practice and aligned with the organisation's goals and objectives (Hudson *et al*., 2001). In fact, Performance measures are applied to provide feedback, give an understanding, encourage intrinsic motivation and stimulate continuous improvement (Lynch and Cross, 1991; Neely *et al*., 1996).

Some researchers were interested in studying the appropriate type of performance measures for organisations to be selected. White (1996) suggested that the following aspects influence the choice of the performance measures:

(1) Competitive priority: cost, quality, flexibility, delivery, reliability, or responsiveness
(2) Source of data: whether internal (within the organisation) or external to be collected from outside;
(3) Type of data: subjective (based on perception or Opinion); or objective (based on observable facts and does not involve opinion);

(4) Reference: whether the performance measures are benchmarked with other organisations or self-referenced;
(5) Orientation to process: to determine whether the performance measures are the input or outcome of some process

Concurrently, Flapper et al. (1996) suggested a new classification of performance measures involving three fundamental dimensions: decision type, aggregation level, and measurement unit. While decision type relates the kind of decision is required such as strategic, tactical or operational, the aggregation level indicates if the performance measure is of global or partial nature. At last, the measurement units relate the financial, physical or dimensionless.

However, a complete approach was introduced by Sink and Tuttle (1989) who have identified six criteria for identifying the performance measures which are effectiveness, efficiency, quality, timeliness, finance and workplace environment. Hudson *et al*. (2001) had founded his contribution on the previous studies namely the one provided by Sink and Tuttle (1989) and some other types of performance measures that have been published in literature (table 9). They generally encompass the quality, productivity, efficiency and effectiveness (Harper, 1984; Sink and Tuttle, 1989; Brown et al., 1994; Coetzee, 1998; Hudson et al., 2001), the human resources dimension, namely customer, employee (Kaplan and Norton, 1992; Cupello, 1994; Brown et al., 1994; Wordsworth, 2001; Neely, 2002; Atkins and Brooks, 2006) and also supplier (Cupello, 1994).

Hudson et al. (2001) merged them into six types of performance measures covering all aspects of business: quality, time, flexibility, finance, customer satisfaction and human resources, as shown in table 9.

Table 9 Various types of performance measures proposed in the literature

Sink and Tuttle (1989)	EFQM Model(1989)	Kaplan and Norton (1992)	*Brown et al. (1994)*	*Cupello (1994)*	Hinks and McNay (1999)	Hudson et al. (2001)
Profitability	Leadership	Financial	Customer and Employee satisfaction	Customer Satisfaction	Business Benefits	Quality
Productivity	Policy and Strategy	Customer	Financial	Employee satisfaction	Environment	Time
Innovation	People	Internal Processes	Product/service quality	Project Performance	Change Management	Flexibility
Quality	Partnership and Resources	Innovation and Learning	Operational	Supplier Performance	General	Finance
Effectiveness	Process, Product and Services		Public responsibility			Customer satisfaction
Efficiency	Customer Results					Human Resources
	People Results					
	Society Results					
	Business Results					

Loosemore and Hsin (2001)	*Neely (2002)*	*Tangen (2003)*	*Atkins and Brooks (2006)*	Liyanage and Egbu (2008)	Lavy et al. (2010)	Abdulrahman (2010)	Meng and Minogue (2011)
Customer Satisfaction	Customers	Financial:	Operational	Control of HAI	Financial	Project Efficiency –Impact on customers	Client Satisfaction
Financial	Employees	Profit margin	Financial	Organisation and Policy	Functional	Preparing for the future	Cost-effectiveness
Non-financial	Supplies	Return on assets	Innovation	Service Levels	Physical	External impact	Service reliability
	Regulators and communities	Return on equity	Customers	Standards	Survey-based	Sustainability	Health and safety
	Investors	Non-financial				Financial, estates and infrastructure	Environmental Compliance
							Client-service provider relationship
							IT application

First, time, quality and flexibility provide the financial results and the operating performance. Customer satisfaction reflects the way the company is perceived externally, whilst the human resources helps the managers to assess the cultural aspects of their workplace environment. These dimensions are not prescriptive, but they are presented as recommended dimensions to be considered when developing performance measures to support the organisation's strategies (Myeda, 2013).

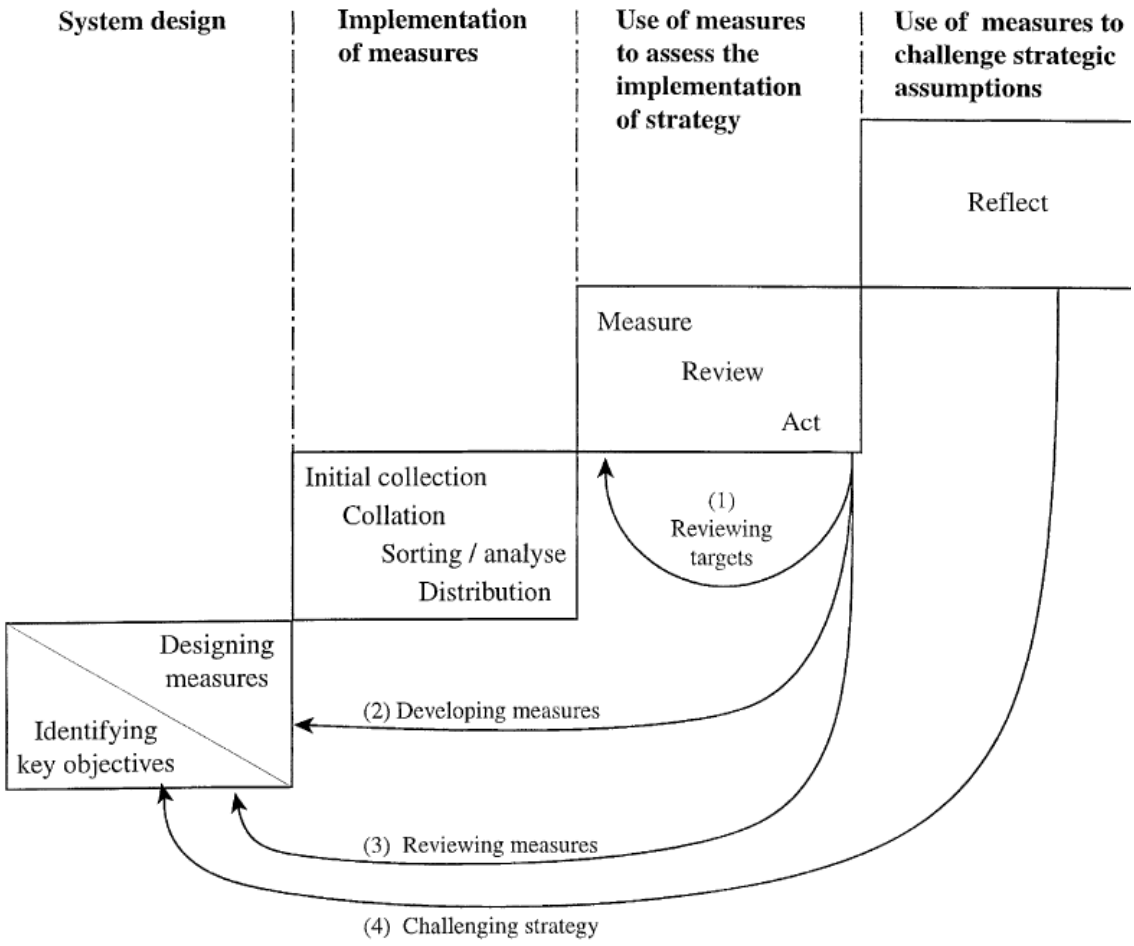
Once the types of performance to be included in the PMS are determined, the number is critical. Slater *et al.* (1997) believe that a PM framework should be limited to between 7 and 12 performance measures. While Bititci *et al.* (1997) believe that the performance measures must take into account the corporate and functional strategies and objectives, Varcoe (1993) suggests that the ideal number of performance indicators should be minimized, by suggesting between five or six well-defined business objectives, each with four to six KPIs.

2.3.9 Challenges in the PMS Development and Implementation

Myeda (2013) stated that various authors have tackled the subject of PMS implementation process and development stages like Eccles and Pyburn (1992); Kaplan and Norton (1993), Vitale and Mavrinac (1994), Flapper and Stoop (1996); Oliver and Palmer (1998).

Bourne et al. (2000) divided the PMS implementation process into three distinct stages (figure 13): the design of the performance measures; the implementation of the performance measures; and the use of those measures.

Figure 13 PMS Development Stages



Source: Bourne et al., 2002

The design stage starts with an overview of the business in order to identify the expectations of stakeholders and clients as well confirm the alignment with the organisation's strategy before listing a new set of objectives for the business (Bourne et al. 2000). It consists of two components: identification of key design objectives and measures design (Bourne et al. 2000). Neely et al.1997 had summarized the list of design recommended actions presented in the literature and issued the "Performance Measure Record Sheet" essential at the launch of any PMS project (table 10).

Table 10 The Performance Measure Record Sheet

Details	
Title	
Purpose	
Relates to	
Target	
Formula	
Frequency	
Who measures?	
Source of data	
Who acts on the data?	
What do they do?	
Notes and comments	

Source: Neely, et al., 1997

Next, the implementation is characterized by the action plan in which systems and procedures are put in place in order to collect and process the data specific to the measurements (Bourne et al. 2000).

The stage that follows consists of the use of performance measures to evaluate the success or failure of the implementation on one hand and to challenge the strategic assumptions on the other hand (Bourne et al. 2000). This evaluation review helps the organisation to revise processes towards a better understanding and effective improvement.

Here comes the problems or challenges as a performance measurement system may be strongly designed, but poor implementation can lead to its failure (Bourne et al., 2000). Literature identified different clusters of Implementation problems which can be political, infrastructural and focus. By political, it is meant the resistance to change in the different levels of hierarchy which had lead in many cases to either resist to measurement or refuse to take actions, weakening the credibility of measures or even playing around the numbers (Bourne et al, 2000)

A second obstacle to the implementation can be information systems or software issues that occur during the implementation which delay considerably in the execution. In many cases, the time-frame of the implementation extends widely. This would cause the distraction of the leaders and loss focus, commitment and involvement of the employees

(Neely et al., 2003). The staff turnover and the reallocation of management into new roles may also affect the robustness of the PMS (Hudson et al., 2001)

In short, Myeda (2013) has summarized the barriers into four main categories: management, employee, formulation and service direction. In her table 11, Myeda (2013) listed many obstacles and barriers encountered in previous researches namely the unclear objectives or benefits from the PMS, lack of commitment of the management and the employee, organisational fears, the non-investment in training and in time, etc..

Table 11 Barriers list

Management	Lack of senior management commitment - Unclear objectives and benefits - Manager's resistance - Insufficient training and support - Organisational fears
(Hudson *et al*. 2001; Hansson *et al*. 2003; Trader-Leigh, 2002!Cheng *et al*. 2007; Brown, 2010)	
Employee	Employee resistance to change - Lack of clarity - Employee fear of being affected -Staff turnover and problems in reallocating new roles -Reluctant to invest in time and energy
(Saad and Siha, 2000;Hudson *et al*., 2001; Hansson *et al*., 2003; Cheng *et al*., 2007; Brown, 2010)	
Formulation	Difficulties in evaluating the relative importance of measures - Identification issues of suitable measures - Unclarity of the process and procedure involved - Striving for perfection - No proper guidance
(Lewy and Mee, 1998; Bierbusse, 1997; Schneiderman, 1999; Hudson *et al*., 2001; Brown, 2010)	
Service Direction	Lack of awareness and understanding of its importance - Lack of strategic planning skill - Reliance on software as solution - More focused on short-term decision making - Priorities given to other management aspects
(Hudson *et al*., 2001; Bourne and Neely, 2003; Brown, 2010)	

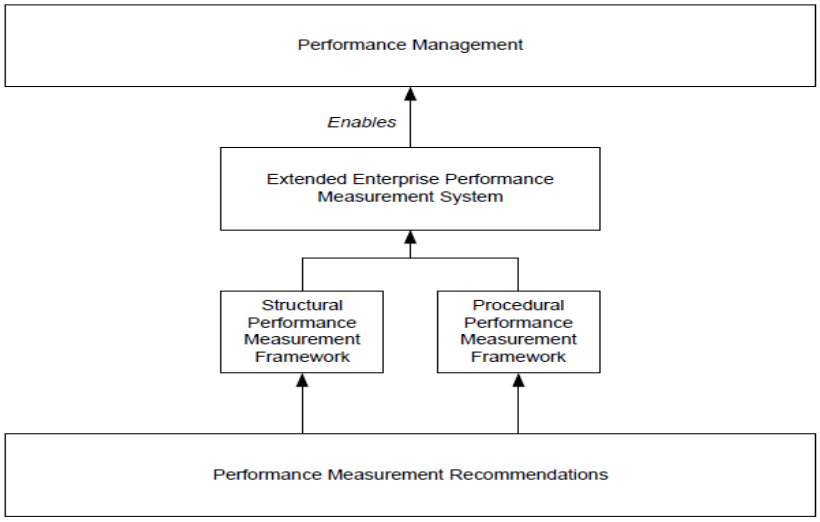
Source: Myeda, 2013

2.3.10 Transition from Performance Measurement to Performance Management

Whereas the academic literature is overwhelmed with performance measurement models designs and implementations, very few studies were addressed to the continuous improvement and the long-term success and transition from measurement to management. The transition cannot be duly applicable if the performance measurement system wasn't dynamic, hindering the organisation from the update of its system in response to any change in the internal or the external context (Bititci and Turner, 2000). Amaratunga and Baldry describe performance management as the use of performance measurement reporting to produce a positive effect or adjustment in the organisational culture, systems and processes. According to Bititci (2000), the management function is not complete until it takes account of planning, executing, organizing, leading and finally controlling after reviewing and taking the necessary actions.

Performance management is effectively described as closed loop control systems where feedback is crucial to benchmark and manage actions with regards to the data measured (Clark and Morgan, 2001). O'Neill and Sackett (1994) used the concept of Extended Enterprise PM (figure 14) in which they promote the development of an integrated PM system based on both structural and procedural frameworks. Mangers review the process of performance measurement and the quality of information provided, agree to reset some performance goals on allocating and prioritizing resources in order to meet and achieve those goals.

Figure 14 Extended Enterprise PM



Source: Folan and Brown (2005)

2.3.11 Realizing Strategy through Measurement of Balanced Perspectives

As stated above, during the 1980s and 1990s, criticism was increasingly escalated against the use of traditional financial based performance measures (Kaplan and Norton, 1996). Organisations cannot build a self-centered performance measurement system as their success and business growth depend primarily of the dynamicity of their environment and the stakeholders' satisfaction (Striteska and Spickova, 2012). The companies need to evaluate performance from an external perspective, listening to customers, suppliers and other stakeholders (Striteska and Spickova, 2012), chasing the information technology evolution. Hence, practitioners and academics are in continuous exploration of new performance management models that encompass all organisations' performance drivers. Johnson and Kaplan (1987) pointed out the deficiencies in the management accounting information used for business management, and indicated the failures of the financial measures to consider changes in the competitive situations and strategies of the changing organisations: such performance measures express past actions, they are neither integrated into the company's strategy, nor flexible to overlook the customer requirements (Kaplan and Norton, 1996). Porter (1992) noted that relying solely on financial performance measures can promote behaviour that sacrifices long-term value creation for short-term benefits. Kennerly and Neely (2003), quoted by Myeda (2014), observed that companies using an integrated balanced performance measurement system perform better than those that do not measure their performance. Any performance measurement system to be effective shall have the measurements derived from strategic objectives (Tangen, 2002). They also must provide timely, relevant and accurate feedback, from both a long-term and short-term perspective. Thus, employee behavior is consistent with corporate goals.

In fact, all those developed systems have specific features to connect strategy to operations carried out, providing a balanced set of measures both financial and non-financial and attempting to realise strategic control (Kumar and Parida, 2006).

Sink and Tuttle (1989) conducted a review of literature and identified several criteria for measuring a company. Their framework builds on the relationship between a company, its suppliers, customers and operations and the processes linking them. A focus linking performance measurement and the strategic planning process is essential and shall takes into account the seven following criteria: the efficiency (systems inputs), the effectiveness (system outcomes), the productivity (outcomes/ incomes), the profitability

(outcomes / inputs), the quality, the innovation and the quality of work life (Sink and Turtle, 1989).

Two years later, Fitzgerald et al. (1991) proposed a normative model for Performance Measurements (PM) categorised specific to services, adapted from the Performance Measurement Matrix, and entailing six dimensions of performance, split between two basic types: those that relate to results (competitiveness, financial performance) and those that focus on the detriments of those results (quality, flexibility, resource utilization and Innovation). A particular strength of the results-determinants framework is that it reflects the concept of causality. However, the model was criticised for ignoring the customer in the performance dimensions (Myeda, 2013).

The famous model linking measurement to organisation's strategy and vision was the Balanced Scorecard (Ronchetti, 2006). The Balanced scorecard grew out of the realization that no single performance indicator can capture the full complexity of an organisation's performance (Kaplan, Norton, 1992). It translates the vision of a business into objectives and performance measures in four perspectives: financial, customer, internal business process and learning and growth (Kaplan and Norton, 1992)

2.3.12 Review of the Key Multi-Dimensional PM Models

An understanding of the existing models is very important for our present study especially because the literature have witnessed different models which have captured some unique, as well as common features. All multi-dimensional or balanced models incorporate both financial (lagging indicators) and non-financial (leading indicators) measures and link performance measures to organisation's vision and strategy. Since the mid-1980s, the need for balanced frameworks has been recognized (Bititci *et al.*, 2005). Neely, *et al.* (2007) mentioned that in response to "calls from practice" for better ways of measuring organisational performance, the researchers developed a wide range of frameworks. Among the most widely cited in are the below frameworks:

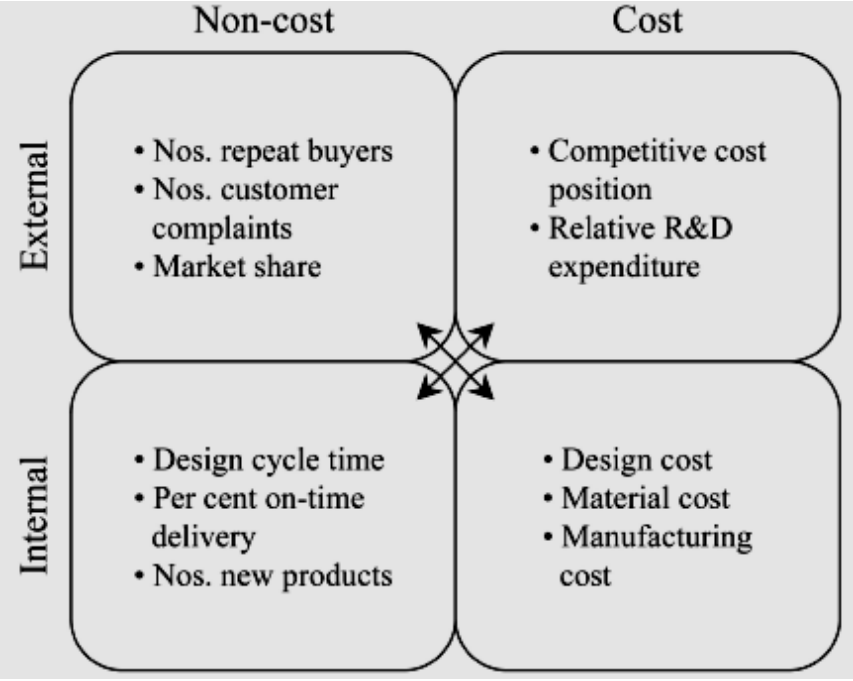
1. Performance Measurement Matrix (Keegan *et al.,* 1989)
2. SMART Performance Pyramid (Cross and Lynch, 1991)
3. Results and Determinants Model (Fitzgerald *et al.*, 1991)
4. Balanced Scorecard –BSC (Kaplan and Norton, 1992)

5. European Foundation for Quality Management (EFQM, 1992)
6. Input, Processes, Outputs and Outcomes /Macro Process Model (Brown, 1996)
7. Integrated Dynamic PM (Ghalayini et al., 1997)
8. Integrated PM System (Bititci et al., 1997)
9. The Performance Prism (Neely *et al.*, 2000)

2.3.12.1 The Performance Measurement Matrix

The performance measurement matrix, developed by Keegan, Eiler and Jones in 1989, categorizes measurement as being 'cost' or 'non-cost' and 'internal' or 'external' (figure 15). A Key strength of the model is the use of the key metric approach and the 'Determine and Decompose' method (Watts and McNair-Connolly, 2012). This involves decomposing departments into functional equivalents and assessing how the departments support the business (McNair and Watts, 2010).

Figure 15 Performance Measurement Matrix



Source: Keegan et al., 1989

Their performance measurement matrix was criticized for not being well packaged as the balanced scorecard and not showing explicitly the links between each of its four items of the matrix (Neely, 2000; Bourne and Kennerley, 2000).

2.3.12.2 Results and Determinants Model

In 1991, Fitzgerald et al. developed a modified system called **Results and Determinants** (Striteska and Spickova, 2012). The objective was to overcome the criticism of matrix considering the complexity of measuring performance within the service sector. In particular, they raised the issue of "intangibility", where unlike manufacturing; the service sector is based around performance rather than objects (Tucker and Pitt, 2009). They assumed that there are two main types of measures, the first are related to results or lagging indicators (competitiveness, financial performance) as shown in table 12, and the others that focus on the determinants of the results or leading indicators (quality, flexibility, resource utilization and innovation).

Table 12 The Results-Determinants Framework

Results	Competitiveness	Measure 1
		Measure 2
		Measure 3
	Financial performance	Measure 1
		Measure 2
		….
Determinants	Quality	Measure 1
		Measure 2
	Flexibility	Measure 1
		Measure 2
	Resource utilization	Measure 1
		Measure 2
	Innovation	Measure 1
		Measure 2

Source: Fitzgerald et al., 1991

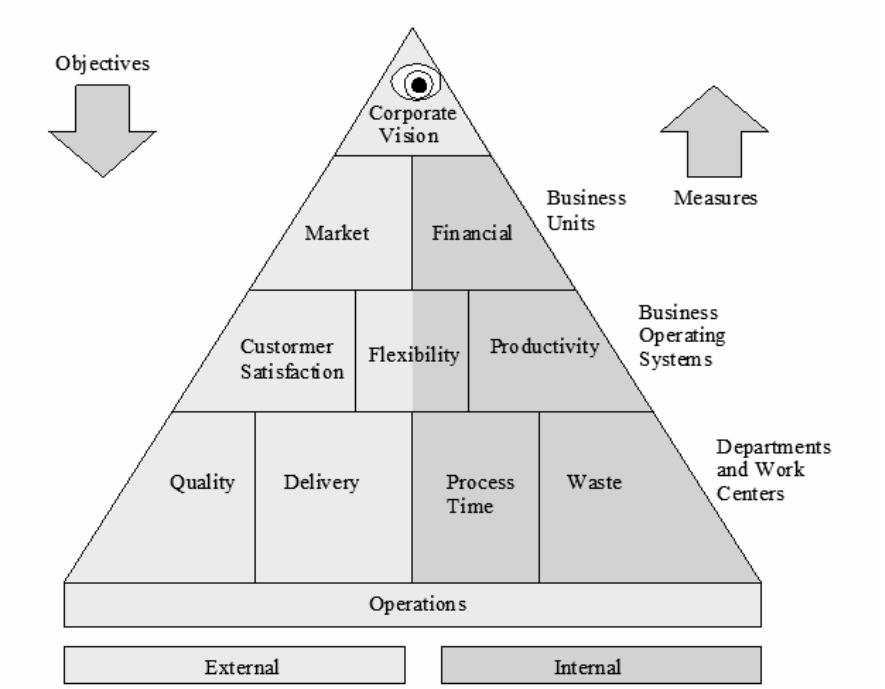
This Results-Determinants Framework reflects the concept of causality as it admits that the results achieved are a reflection of past business performance in relation to specific determinants (Neely, 2007).

2.3.12.3 The SMART Performance Pyramid

The Strategic Measurement Analysis and Reporting Technique (SMART Model), developed by Lynch and Cross in 1991, is a significant change in the literature on performance measurement, focusing first on linking strategy to operations by internal and

external performance measures, and modelling the economic entity as an integrated system of four level pyramid of objectives and measures (Susilawati et al., 2013).

Figure 16 The SMART Pyramid Performance Model



Source:

McNair Exhibit 4, p.21 adapted from Cross and Lynch, 1989

At the top of the pyramid, as shown in figure 16, the management assigns a corporate portfolio role to each business unit (Lynch and Cross, 1991). At the second level, objectives for each business unit are defined in terms of market positioning and financial outcomes. At the third level, more tangible operating objectives and priorities can be defined for each business operating system in terms of customer satisfaction, flexibility and productivity (Lynch and Cross, 1991).

Although connecting the hierarchical view of business performance with the business process view is the main strength of the SMART Pyramid (Neely et al., 2003), it fails to specify the kinds of measures and does not explicitly incorporate the concept of continuous improvement (Striteska and Spickova, 2012).

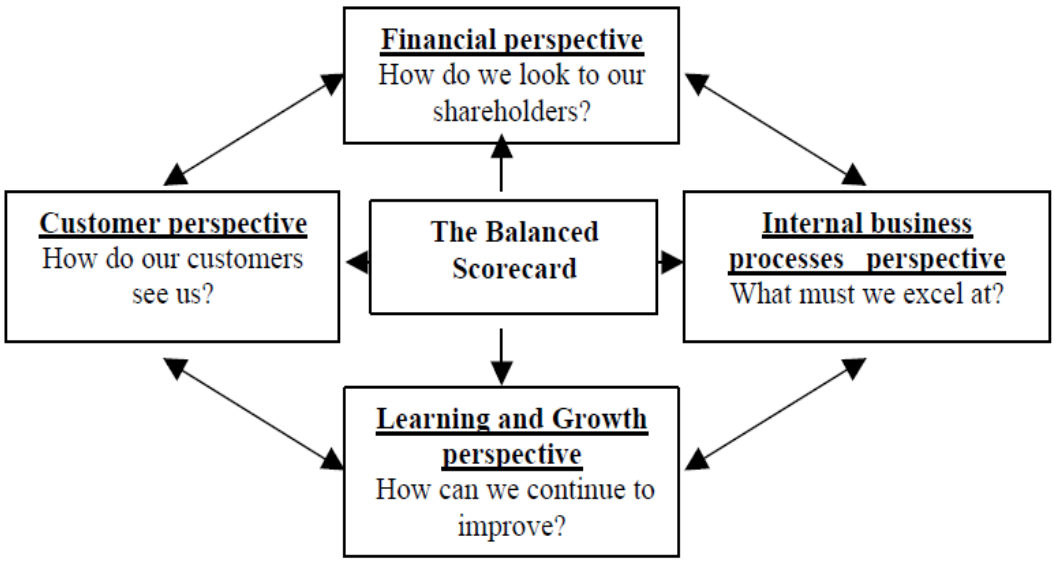
2.3.12.4 The Balanced Scorecard

Unlike traditional approaches, Kaplan and Norton (1992) introduced the balanced scorecard (BSC) to evaluate whether a business is moving towards its strategic goal from

four different perspectives: financial, customer, internal business process, and learning and growth. The BSC attempts to overcome the deficiencies of existing measurement systems by analysing results across a range of activities (Sanger, 1998).

The BSC four perspectives (see figure 17) allow a balance between short-term and long-term objectives, between desired outcomes and the performance drivers of those outcomes, and between the objective measures and subjective measures (Kaplan and Norton, 1992).

Figure 17 The Balanced Scorecard



Source: Kaplan and Norton (1996)

When Kaplan and Norton (1992) introduced their version of the balanced scorecard, there was recognition across the management field that new management systems required new measurement methods and mentalities (Mc Nair and Watts, 2009). BSC is regarded at that time as a tool to support strategic management by integrating traditional financial measures with operational and softer customer and staff issues, which are vital to growth and long term competitiveness (Newing, 1995). In addition, while traditional financial measures report on what happened during the last period, without indicating how managers can improve performance in the next, the scorecard functions as the cornerstone of the organisation's current and future success (Kaplan et al, 1993).

Although the BSC is one of the most highly applied and advertised performance management tools (Lussier, 2006; Shulver and Lawrie, 2007), it has been criticized for its

top down approach and for not being suitable for small and medium organisations or strategy might not be that clear (Watts, 2009).

Few years after and exactly in 1996, Kaplan and Norton had worked out an improved BSC framework, named "The strategic BSC" that incorporates lead and lag indicators which yield two directional cause-and-effect chains. This process implies that strategy is translated into a set of hypotheses about cause and effect: the strategic balanced scorecard is not just a strategic measurement system but also a strategic control system (Kaplan and Norton, 1996, 2005). Kaplan and Norton (1992) emphasized the need to tie measurements to a well-developed strategy, resulting in a 'top down' model of measurement and control. Lynch and Cross (1991) and Parker (2000) argued for the need to use a 'bottom-up' methodology. To these experts, the goal was to create measurements that reflected strategy but emphasized as well the operational performance. They raised the problematic of lack of ownership in the BSC and the need to motivate employees to get involved in the BSC. This argument was reinforced by Norreklit (2000) who described the BSC as hierarchical and top-down method which disregards the motivational aspirations of employees and the need to develop internal commitment.

Whether 'top-down' or 'bottom-up' in nature, though, the interpretations of BSC proved lacking in several ways. The BSC model often proved to be a poor fit for small and service organisations (Mc Nair and Watts, 2010) as the model explicitly rely on a well-developed corporate strategy for successful implementation.

Another criticism was made blaming that the four perspectives were not universal and not sufficient: some important KPIs or critical success factors are missed just because they do not fall neatly into any of the categories (Papalexandris et al., 2005). Likewise, considerations on the external environment are limited to customers. Companies normally interact and leverage the relationship with other actors, like suppliers, alliance partners, local community unions and final consumers (Halachmi, 2005). Kagioglou et al. (2001) added two additional perspectives for the construction industry (project and sub-contractors' perspectives).

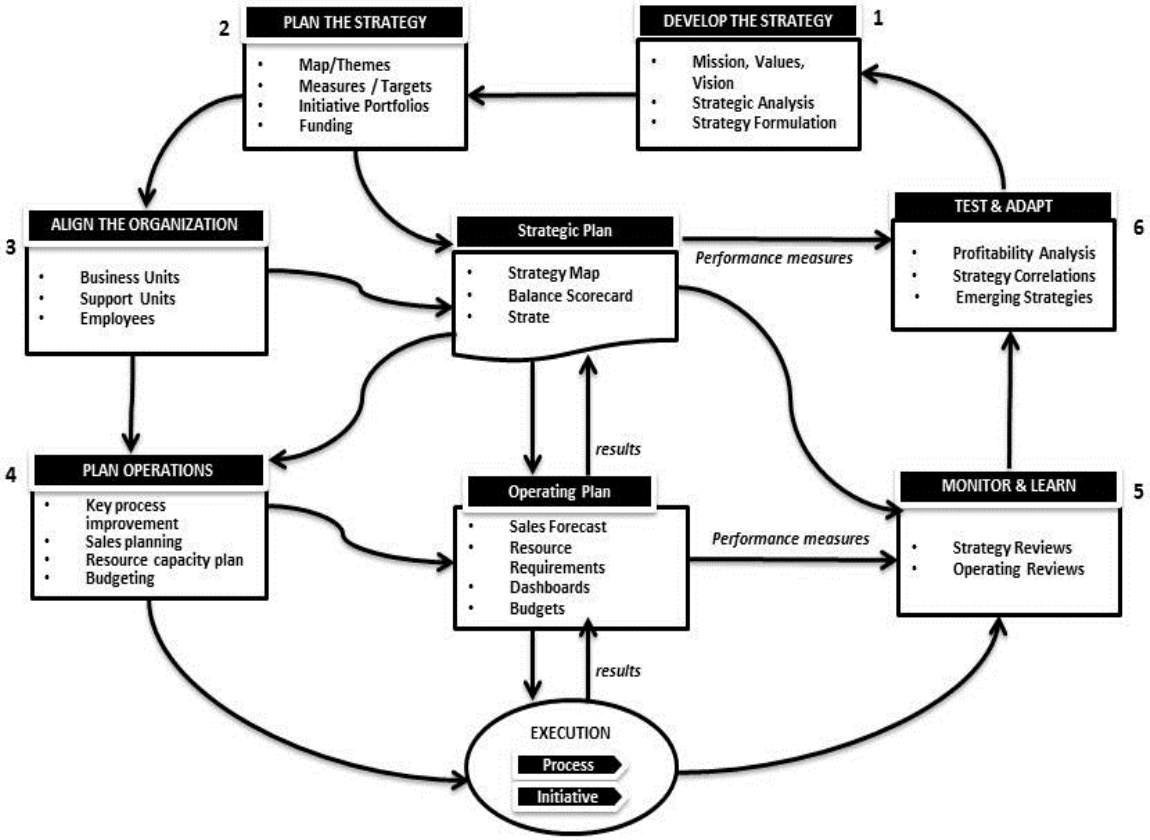
Equally, Yahanpath and Islam (2014) assess that one of the major weaknesses of BSC is that it captures only four perspectives of an organisation – financial, customer, internal business process, and learning and growth. These four perspectives may be considered sufficient during the 1990s where the business world was less challenging and complex,

and firms didn't have to face fierce competition of globalization. But in the 2000s, firms have had to face these challenges and their complexity and, sometimes, the dreadful face of globalization. This is the reason why today's firms need to consider not only the four perspectives mentioned in BSC but also other relevant perspectives which are necessary for sustainability. Atkinson, Waterhouse and Wells (1999) criticized the BSC model as being incomplete as it fails to highlight the contribution of its employees, suppliers and the community when defining the environment in which it operates, and finally, and to identify performance measures to assess stakeholders' contribution. Moreover, Soderquist (2004) identified three more classifications to measure performance, in addition to the four perspectives used in the BSC: (i) strategic (strategic goal satisfaction); (ii) technology management (generation of new competitive products); and (iii) knowledge management (return on investment in terms of knowledge creation, knowledge transfer and knowledge exploitation).

Some other authors criticized the BSC for its over simplicity (Kagioglou et al. 2001), for not being able to align strategy with competitive environment (Sinclair, Zairi 1995a, b, c; Kagioglou et al. 2001) nor conducting benchmarking (Vukomanovic et al. 2008), and being designed only for specific industries (Papalexandris et al.,2005).

Thanks to various criticism and application limitations studied from 1992 to 2008, the BSC has evolved from its original or first generation the fourth generation of BSC, linking the strategy to operations by the modern strategic management system (Shahin et al., 2012; Cobbold and Lawrie, 2004) (figure 18). New concepts such as focused-strategy organisations, strategy maps, destination statements (DSs), and strategy alignments were introduced (Shahin et al., 2012). Without excellent operational processes, no strategy can be properly performed, and without a suitable designed strategic vision, operational excellence is not adequate (Kaplan and Norton, 2008) cited by (Shahin et al., 2012).

Figure 18 Linking Strategies to Operations by the Modern Strategic Management System



Source: Shahin et al., 2010

2.3.12.5 The EFQM Model

The EFQM Excellence Model was introduced at the beginning of 1992 as the organisational assessment framework for the European Quality Award. It originally aims to assess company's business excellence by identifying deviations of performance against the best practice and generating a stimulus in the form of improving activities (Beatham et al. 2004).

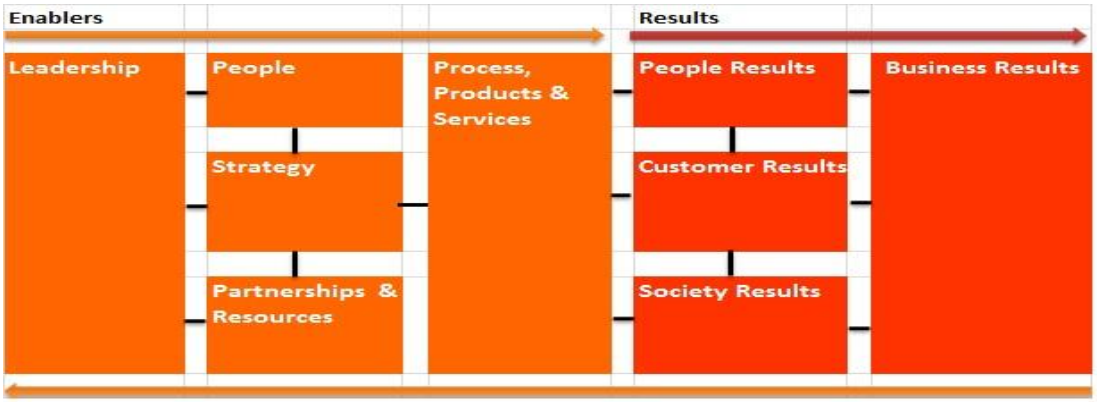
Being now the most widely used organisational framework in Europe (Eskildsen and Dahlgaard 2000; Rajpal 2007) and the foundation for a wide range of national and international quality awards (Daniel et al., 2011; Chittenden et al., 2013), the EFQM is a non-prescriptive framework based on nine criteria representing leading edge management practices (Porter et al., 1998) as shown in figure 18. Like any other performance measurement tool, this model can be considered both a way of verifying the fulfilment of

the excellence standards and also as a guide for the strategic direction of a company (Escrig and Menezes, 2016). Some researchers indicate that organisations implementing business excellence models in general realize significant benefits including both increased financial profit (Hendricks and Singhal 1996, 2000; Hausner 1999; Hansson and Eriksson 2002; Jacob et al. 2004; Boulter et al. 2013) and non-financial outcomes (GAO, 1991; Powell, 1995; Curkovic et al., 2000; Douglas and Judge, 2001).

The European Excellence Model (2010) declares that: "*The EFQM Excellence Model is a practical, non-prescriptive framework that enables organisations to integrate existing and planned initiatives, removing duplication and identifying gaps*." The EFQM is then based on a static design, contrary to BSC (Beatham et al., 2005; Vukomanovic, 2006) and contains a set of standards and strategic objectives, which can be, according to EFQM, implemented in every industry (Vukomanovic 2011).

Figure 19 represents the model with its criteria. Five of these are "Enablers", lagging indicators, (leadership, people, policy strategy, partnership and resources, and processes) and four are "Results", leading indicators, (people results, customer results, impact on society results and business results). The "Enablers" criteria cover what an organisation does (Calvo-Mora et al., 2005). The 'Results' criteria cover what an organisation achieves. "Results" are brought about by "Enablers", and "Enablers" are improved using feedback from "Results".

Figure 19 EFQM Model

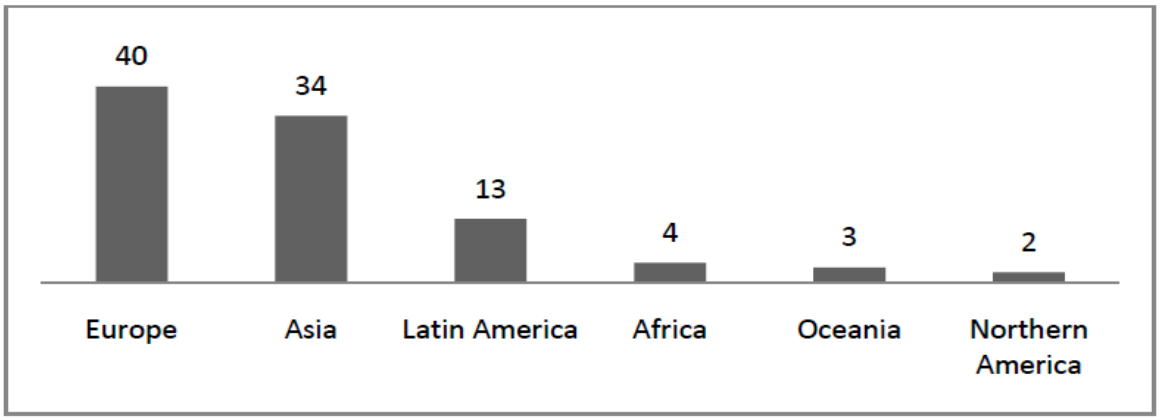


Source: European Foundation for Quality Management, 2012

The Model is currently used by thousands of organisations mainly throughout Europe as they find EFQM much easier to use than BSC, since the methodology of self-assessment is prescribed (Lawrie et al. 2004). Moreover, an overall picture of the different quality

awards different countries is conveniently given by Mohammad and Mann (2010) who have categorized the international quality awards according to various qualitative aspects (figure 20).

Figure 20 Number of Quality Awards across the continents



Source: Mohammad and Mann (2010)

Table 13 lists the total number of awards at different regions of the world and also provides a comparative assessment of the award criteria used. It shows that the majority are modelled using EFQM criteria (32 EFQM based), but also it should be noted that some of the countries have followed a combination of two or three international awards to develop the award criteria which includes the EFQM. EFQM criteria are always shown in the two columns “others” or “not known”.

Table 13 International Quality Awards and Award criteria

Region	Total awards	MBMQA Based	EFQM Based	Not Known	Others
Africa	4	2	2	0	0
Asia	34	14	5	7	8
Europe	40	4	25	4	7
Latin America	13	5	0	5	3
North America	2	1	0	1	0
Oceania	3	1	0	1	1
Total	96	27	32	18	19

Source: Mohammad and Mann (2010)

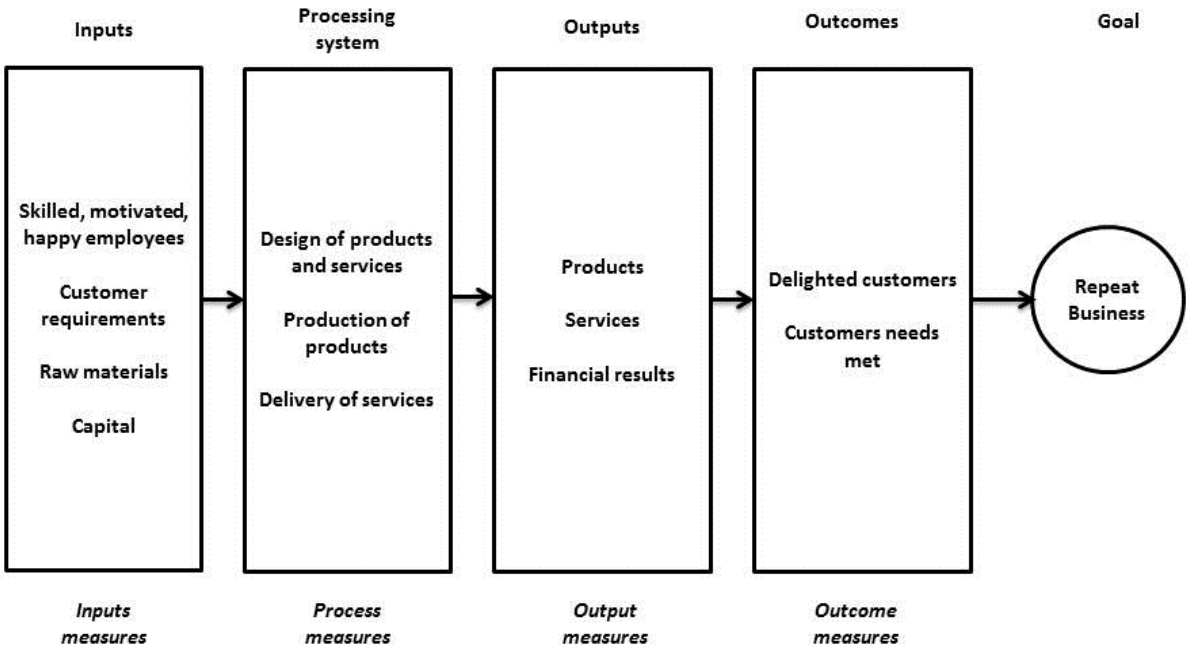
On the other hand, the EFQM model has also received a number of criticisms (Codling 1995; Andersen et al. 2000; McCabe 2001; Lam, 2011), mainly for not being able to focus and connect with strategy and strategic integration process or to connect causes and consequences (Rusjan 2005; Junnonen 1998). Some research findings indicate that the use of Business Excellence Models does not guarantee success (Powell, 1995; Jennings and Beaver, 1997), and companies complain that they encounter difficulties in using such models (Stephens et al., 2005). Many others point to the potential weaknesses related to the operations of self-assessment in relation to award applications (McTeer and Dale, 1994; Wilkes and Dale, 1998; Samuelson and Nilsson, 2002; Li and Yang, 2003; Lee et al., 2006). Even if the latest version of the EFQM Excellence Model (2010) has been improved by focusing more on achieving "a full integration of the Fundamental Concepts of Excellence", the above inconsistency related to the values and culture aspects persists (Dahlgaard et al. 2013).

2.3.12.6 The Macro Process Model

While the performance measurement frameworks considered so far tend to have hierarchical orientation, Brown (1996) has developed a framework identified as the "Macro Process Model" showing the horizontal flow of materials and information within a company. Brown's framework, which is shown in figure 21, is a process focused model in which Brown emphasizes on the difference between input, process, output and outcome measures. Brown's framework was criticized for being too focused on the process rather ignoring totally the hierarchical structure of an organisation (Neely et al.,

2000). It fails to ties together the hierarchical view of measuring business performance with the business process view (Taticchi et al., 2009).

Figure 21 The Macro Process Model



Source: Brown, 1996

Table 14 Analogy of Macro Model

Items	Analogy
Input	Volume of flour, quality of eggs, etc.
Process	Oven temperature and length of baking time
Output	The quality of the cake
Outcome	Satisfaction of the cake eaters

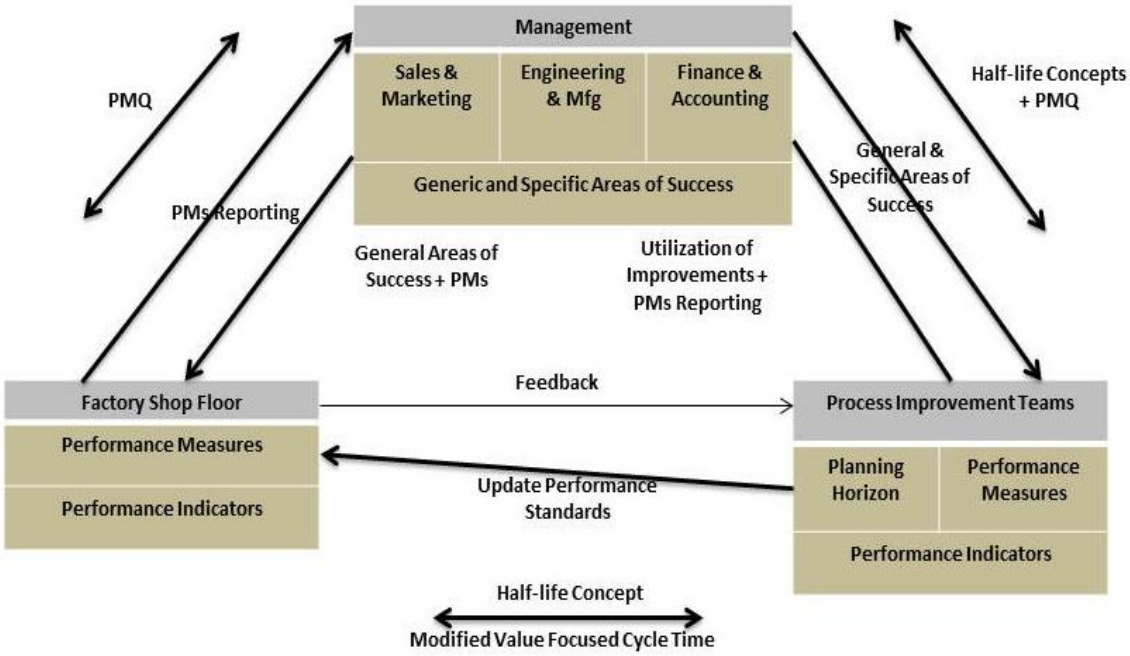
Source: Brown, 1996 (adapted)

In table 14, Brown used a useful way to explain the concept of his model: a Cake Baking referred to his framework in every stage of baking a cake: from the quality of materials used (input), to the importance of process (temperature and time), to the output (quality of the cake) and finally the satisfaction in which we measure the output comparing to the expectations (Bourne et al., 2003).

2.3.12.7 The Integrated Dynamic Performance Measurement System

This framework developed by Ghalayini et al. (1997) is concretely based on the integration of three main dimensions: the management, the process improvement of teams and the factory shop floor. The Integrated Dynamic PM System (hereafter called IDPMS) endeavours to measure general and specific areas of success by emphasizing on how the improvement has been evolving. It represents a good system of performance reporting, however it lacks the capability to assess the organisation overall performance. This framework doesn't tackle the human resources, customers, suppliers or any stakeholders to evaluate the external performance of the company (Susilawati et al., 2013). Although it provides a process for ensuring fast feedback, the system seems complicated as it has several different tools that might confuse the users (Figure 22). The Integrated Performance Measurement System (IPMS) proposed by Bititci et al. (1997) provides a useful process in identifying the link between the performance measures and strategic plans of the business. It is symbolizes the "closed loop control system" as it measures the process of performance management. The main strength of this framework is that encourages and involves the continuous improvement. Nevertheless, it fails to provide a structured process to detail objectives and according timeframes for its conception and implementation (Pun and White, 2005).

Figure 22 The Integrated Dynamic PMS

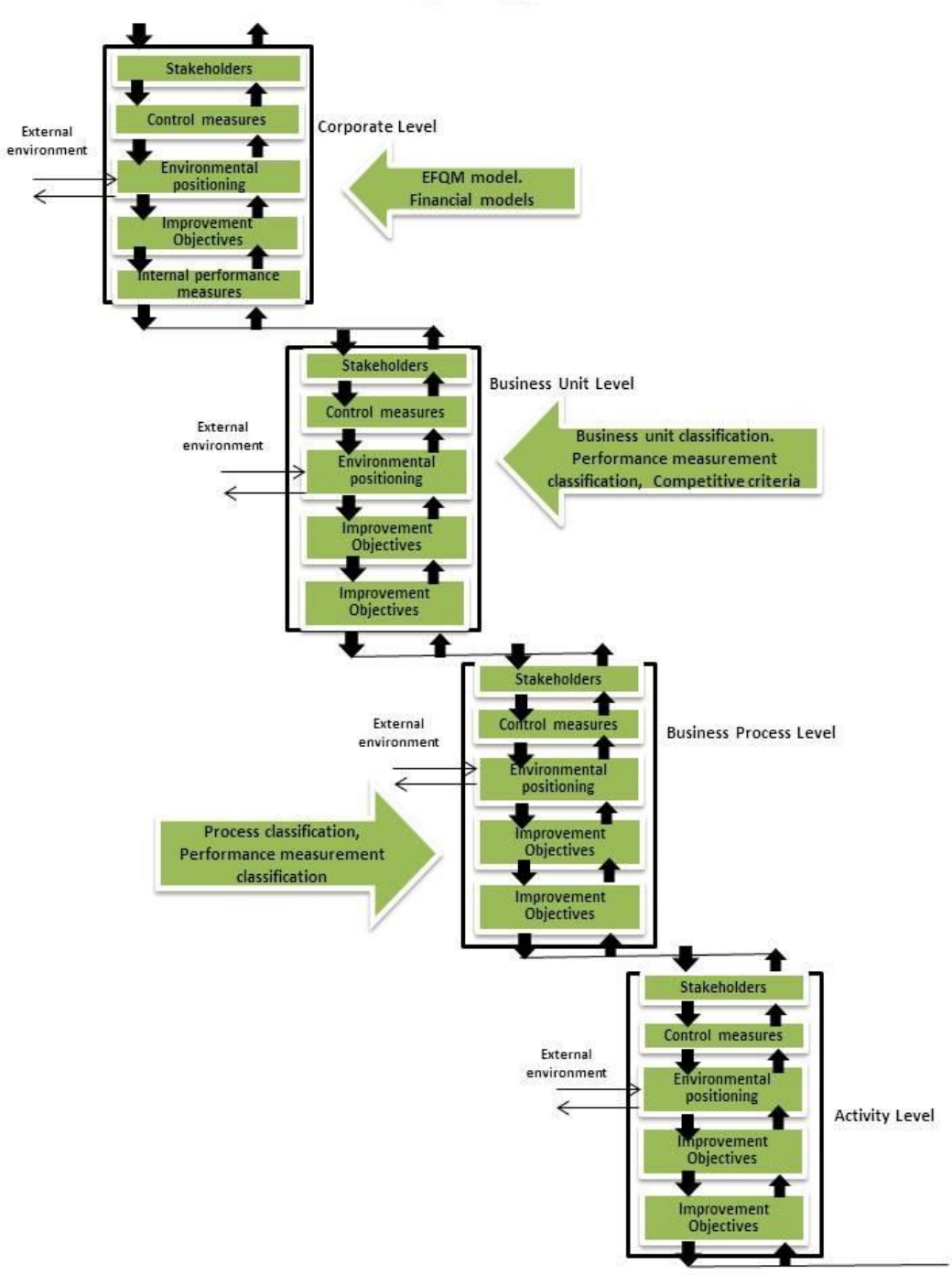


Source: (Susilawati et al., 2013)

2.3.12.8 The Integrated Performance Measurement System

The Integrated Performance Measurement System (IPMS) proposed by Bititci et al. (1997) provides a useful process in identifying the link between the performance measures and strategic plans of the business. It symbolizes the "closed loop control system" as it measures the process of performance management. This framework consists of four levels: corporate, business units, business processes and activities (see figure 23). The main strength of this framework is that it encourages and involves the continuous improvement. Nevertheless, it fails to provide a structured process to detail objectives and according timeframes for its conception and implementation (Pun and White, 2005).

Figure 23 The Integrated Performance Measurement System



Source: (Susilawati et al., 2013)

2.3.12.9 The Performance Prism Model

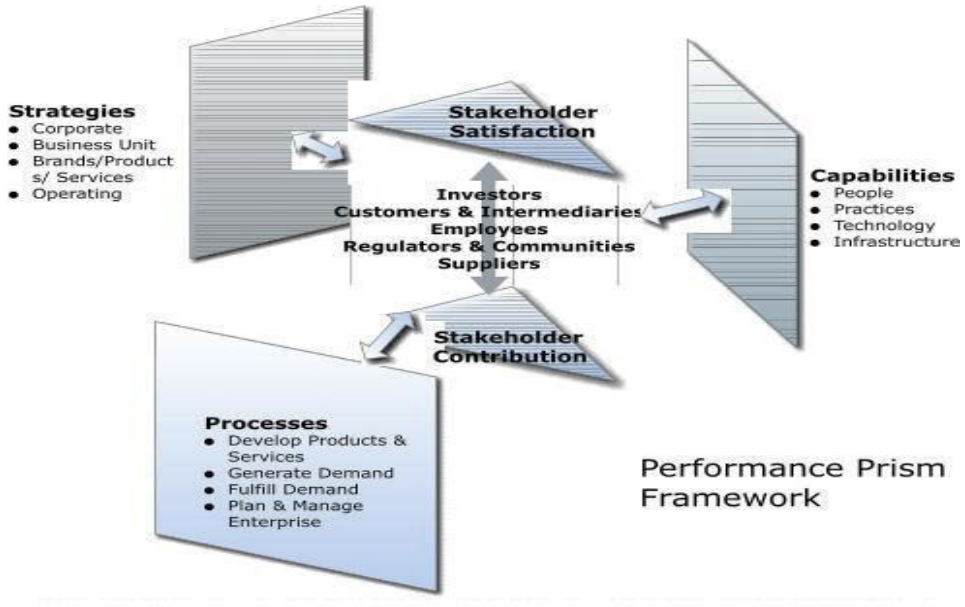
Neely and Adams (2001) developed the Performance Prism framework based on five performance perspectives: stakeholder satisfaction, strategies, process, capabilities and stakeholder's contribution (figure 24). It is clear that this framework has a comprehensive

external organisation view that focuses on stakeholders - including customers, employees, suppliers and regulatory community, but less attention to measure the actual process (Bassioni, 2004; Wu, 2009).

The Performance Prism framework attempts to overcome previous models' limitations by including new stakeholders who were generally disregarded previously, and by considering the stakeholders' contributions to performance (Yahanpath and Islam, 2014). The performance prism is not a prescriptive measurement system (Striteska and Spickova, 2012). According to this framework, the performance measurement should not be derived from the strategy: instead, "strategies should be put in place to ensure the wants and needs of the stakeholders are satisfied" (Neely et al. 2001). Thus, the strength of this model is that it encourages the management team to consider the vital issues and the strategies that address them.

However, this framework lacks sufficient link between the results and the drivers and offers too little on how performance measures are implemented (Striteska and Spickova, 2012). This framework has been a serious concern for academic communities as the mark of Performance Prism is not truly proven as best measurement but it seems to be working in practice (Sorooshian et al. (2011).

Figure 24 The Performance Prism



Source: Neely and Adams, 2002

2.3.12.10 Strengths and Weaknesses Summary

Each model presented above has its own merits, features and added value when it was developed; they had all faced criticisms from reviewers on various fronts. Some of the most observed shortcomings of performance measurement systems are listed below were the lack of systematic method for selecting measures, lack of provision for benchmarking, lack of connection with organisation's mission and strategy, the failure in addressing the practicalities of measurement, the lack of systematic method for prioritising measures, etc. (David and Joseph, 2014).

Folan and Brown (2005) criticised the majority of PM models for being insufficient. They proved that the PM frameworks were getting complexity through the time in terms of measurement scope, claiming that Sink and Tuttle is the simplest one with one measurement (planning) in functional area. According to them the main focus in PM framework design was either structural or procedural. However, "PM frameworks that produce a systemized procedure towards measurement are handicapped by the absence of a structural element to allow for management and selection of individual performance measures; similarly, structural PM frameworks lack a procedural element. Structural and procedural PM frameworks are usually developed in isolation; they are only combined in PM systems" (Folan and Brown, 2005). It is obvious that a comprehensive framework shall encompass both: *(i)* the structural aspect which is concerned by the selection of elements and by the administrative part of the PM process, and *(ii)* the procedural which is concerned by determining how the process of PM shall be carried out.

Table 15 Comparison of Performance Measurement frameworks

Researcher	Dimensions of measurement (if any)
Sink and Tuttle	-
Performance measurement matrix(Keegan et al. Model)	Cost; non-cost; internal environment; external environment
Results and Determinants Framework (Fitzgerald)	Results Determinants
Performance pyramid (Lynch and Cross)	Vision; market; financial; customer satisfaction; flexibility; productivity; quality; delivery; cycle time; waste
Balanced Scorecard (Norton and Kaplan)	Financial; internal business; customer perspective; innovation and learning
Brown's Framework	Inputs; process; outputs; outcomes
EFQM model	Enablers Results
Performance Prism (Neely et al.)	Stakeholder satisfaction; strategies; processes; capabilities; stakeholder contribution

Source: Folan and Brown (2005) (adapted)

Wisely, Striteska and Spickova (2012) summarized the main strong and weak points of the most widely cited performance measurement models and frameworks on the basis of literature review (table 16).

Table 16 Main strong and weak points of the performance measurements models and frameworks

	Strong Points	Weak Points
Performance Measurement Matrix(Keegan et al., 1989)	specifies, in reasonable detail, what the measures should look like provides a useful development process	Does not include customers or human resources as dimensions of performance Cannot give a truly balanced view of performance. consists of several different tools - is potentially complicated to understand and use fails to provide an explicit process for developing the PM model
SMART Performance Pyramid (Lynch and Cross, 1991)	-attempt to integrate corporate objectives with operational performance indicators -manage PM strategically	- does not provide any mechanism to identify key performance indicators - fails to specify the form of the measures - does not explicitly integrate the concept of continuous improvement
Results and Determinants Matrix (Fitzgerald et al., 1991)	Specifies what performance measures should look like and provides a useful development process	Does not include customers or human resources as dimensions of performance and cannot give a truly balanced view of performance
Performance Prism (Neely et al., 2000)	- reflects new stakeholders (such as employees, suppliers, alliance partners or intermediaries) who are usually neglected when forming performance measures - considers the stakeholders' contribution to performance ensures that the performance measures have a strong foundation	offers little about how the performance measures are going to be implemented - some measures are not effective in practice - short of logic among the measures, no sufficient link between the results and drivers - no consideration is given to the existing PMSs that companies may have in place
Balanced scorecard (Kaplan and Norton, 1992)	- clarity of vision and strategy adopted - consistent monitoring of strategy - concentration on strategic, in the competition environment critical business objectives - cross-disciplinary and hierarchy traversing communication process integration of performance measures for operational objectives at an appropriate level - cause/effect relationships as instrument for management	- does not express the interests of all stakeholders - lack of long-term commitment and leadership for management - too many/few metrics – development of unattainable metrics - lack of employee awareness or a failure to communicate information to all employees - constructed as a controlling tool rather than an improvement tool - lack of integration between the top level, strategic and operational level, giving a potential problem in the execution of strategies - inappropriate to benchmarking
European Foundation for Quality Management (EFQM, 1992)	- systematic and non-prescription model - using of self-assessment approach in order to organisation excellence - strengthen the sense of quality - recognition of strong and weakness points of organisation - consist of criteria hierarchy - allow shortlist of indicators based on "Good example" of practice - creating conditions for comparative analysis of business processes with external business	- no focus / priorities - no links - criteria are not specific within the company – no possibility for differentiation - is not strategic management tool (systematic setting and achieving goals) - therefore, is not instrument for strategy implementation - is not suitable for enterprise communication - tendency to bureaucracy - did not give guidelines how to design and conduct effective performance measurement
Integrated Dynamic PM (Ghalayini et al., 1997)	-Explicit process for maintenance and for ensuring fast and accurate feedback	Several different tools are potentially complicated to understand and use Fails to provide an explicit process for developing the PMS and is inadequate with respect to the human resource dimension
Integrated PM System (Bititci et al., 1997)	Links between performance measures and strategic plans and/or critical Success factors of the business Covers many of the criteria required for a comprehensive PM	Fails to provide a structured process that specifies objectives and timescales for development and implementation

Source: Striteska and Spickova (2012)

2.3.13 Conclusion on the PMS

Performance Measurement systems have been evolving with the business requirement and expectations of the companies. The financial or accounting based which were largely adopted before 1980 were heavily criticised by the research community (Kaplan, 1991) for not covering all aspects of organisational performance. Various researchers attempted, throughout the history, multidimensional frameworks encompassing more than one managerial aspect and linking strategy to operational performance.

This section provided also the major components and characteristic of a successful PMS as well as the criterion selection process of performance measures. It has displayed as well the main barriers or problems identified in practice from the conception of a PMS till it execution and implementation. The lack of management commitment or involvement as well as the resistance to the employee to change was considered the main barriers to a successful implementation.

Moreover, literature review shows a little focus of studies on the transition from performance measurement to performance management. This topic is still undermined where a closed loop control system is needed to assess the performance measurement process, and the quality of information reported, and then to propose action plans accordingly in order to enhance the organisational performance.

2.3.14 Section Summary

The second part of the literature chapter handled the performance measurement in business management.

The literature offered different perspectives in defining the performance measurement while some researchers defines it as a metric used to quantify the effectiveness and the efficiency of an action, others perceive in it a monitoring and control process. It is by all means a sign of the wellbeing of the organisation's as well as a process allowing the organisations to maintain their control while pursuing their strategies.

The PM systems or models expanded throughout the history and evolved from being financially and accounting based systems to multidimensional frameworks encompassing

balance approach of different perspectives of business performance: customers, stakeholders, financial, process, employees, learning and development, society, etc...

This section identified also the key success factors of performance measurement systems as well as the barriers to a successful implementation.

Although the research was made on all the performance measurement models that came into sight in the academic world, the researcher focused on the most widely referred frameworks.

This section presented their respective shortcomings, weaknesses and strengths as well as their specific features characterizing a particular industry, if any. The following part exposes the various FM specifically designs PM models related in previous studies.

2.4 Performance measurement in facilities management

2.4.1 Overview

Although performance measurement is recent to FM, some studies have appeared in the last few years to investigate the application of individual models in particular areas. For instance, researchers such as Loosemore and Hsin (2001), Amaratunga and Baldry (2001), Sharshar (2002), (Ho et al., 2000), Shohet (2006), Liyana and Egbu (2008), Lavy et al. (2010), Enoma and Allen (2007), Meng and Minogue (2011), Abdulrahman (2010), Myeda (2013) and some others investigated the key indicators for the performance of maintenance management in healthcare facilities, airport, public offices and in specific countries such as UK, Australia, South East Asia and Malaysia.

However, there is a lack of a systematic investigation of performance measurement framework in the context of FM service provider as organisation. They mainly study the relevance of the indicators to be measured. Therefore, it is difficult to justify whether these models are effective or not (Meng and Minogue, 2011). This section attempts to explore the adoption of performance measurement and compare the effectiveness of existing models in FM practice. It also addresses some other key issues in the measurement and improvement of FM organisation's performance.

2.4.2 The Rationale in Measuring FM Performance

Amaratunga (2000) highlighted the contrast between the acceptance growth among practitioners of a need to FM performance and the lack of systematic process of identifying proper measures. In fact, performance measurement is an essential tool enabling a good planning and control, good resource allocation, and continuous improvement (Sinclair and Zairi, 1995). It supports FM managers to understand the future of their project or organisation, to follow up their targets and objectives, to take actions when the situation is deviating in order to achieve an optimal service delivery (Rose, 1995).

Kamaruzzaman et al. (2013) have highly alerted on the importance of a specific PM in measuring the FM services. Performance measurement in FM is seen as a critical success factor in the strategic development process and as a learning process within the FM service provider (Amaratunga, 2000). FM organisations, being responsible of the

planning of buildings assets maintenance, workplace improvement and resources deployment, need eagerly to carry out measurement to screen and address hidden issues and to control initiatives and to assess wither those quality initiatives achieved the desired outcome (Cupello, 1994).

The majority of studies in FM emphasizes on the role of the corporate real estate function, outsourcing decisions or more general management issues (Kadefors, 2008), they'd rather focused on the profitability, the economic value of the FM with regard to the environment and sustainability (Enoma and Allen, 2007) instead of studying the performance from a FM perspective. Only few were identified focusing on specific industry related FM issues such as healthcare, airport or infrastructures areas.

Myeda and Pitt (2013) stated the FM organisations shall focus on constant evaluation process as there is a strong correlation between customer satisfaction and performance once enhanced. They highlighted a big concern of unprofessional practice by the FM managers and which can be resolved by putting in place a performance measurement system. However, the absence of a robust PM system might be the main reason for the lack of a comprehensive set of performance indicators and measures in FM services (Liyanage and Egbu, 2008). The need of a comprehensive framework indicating how performance is conceived and practiced in the FM service as a whole is on high priority in the academic community (Myeda, 2013).

2.4.3 The role of Performance Measurement in Facilities Management Organisations

Improving organisational performance is crucial for every organisation seeking to achieve the targeted results and objectives. However, before setting out any performance measurement system, the organisations shall have a proper trust culture based on the perception of their members or employees (Myeda, 2014).

Hence, the provision of a PM framework in FM will generally benefit both client and the business management (Bititci et al., 1997), taking into account the participation of the organisation's related departments to form agreed goals and indicators to enhance the service delivery (Myeda, 2013). "In facilities management, effective performance measurement approaches play an important role in focusing people and resources on a particular aspect of organisational task (Waggoner et al., 1999)" quoted by (Simoes et al.,

2011). Amaratunga and Baldry (2002) propose that PM could generate results about what had happened but not why and what to do about it.

PM will no doubt ensure a healthy climate to the organisation, it help firms to recognize and define their strategies, measure their strategic performance, and improve their competitive advantage (Luu et al. (2008). Pillai et al. (2002) believe that PM can help evaluate the overall performance of a project at any point of time during its life cycle.

Amaratunga (2000) highlighted that FM organisational performance to be determined by facilities relevance to the core business its contribution in managing the space to the resources management, environment and services provision as well as the logistics support to operations to those organisations (Nutt, 1999).

Parida and Kumar (2006) justified the implementation of a maintenance performance measurement process by considering the importance for the FM companies to measure the value created by their service, to revise their allocation of resources, to consider the health and safety issues in their daily operations, to enrol the knowledge management within their structure, justify their investments, etc...

2.4.4 Performance Management Models and their respective measures in the FM industry

PM is often referred to as the use of a multi-dimensional set of performance measures Neely *et al.*, 2003). It is only relevant within a reference framework against which the efficiency and effectiveness of action can be judged (Myeda, 2014).

Yang *et al*., (2010) mentioned that many frameworks are established to evaluate and compare the performance of projects, organisations and stakeholders. Also, Enoma and Allen (2007) all measurements must relate, functional and financial attributes on the one hand and also consider customer satisfaction, flexibility and productivity on the other). Varcoe (1993) has suggested that FM performance criteria must be based on cost, quality and delivery. PM should be a means to manage and improve performance and it has to prove the FM contribution to an organisation's core business by delivering quality and cost effective and user- satisfied services (Moss *et al*., 2007). Therefore, a powerful FM tool needs to be able to handle the collection of a massive amount of data and its communication as information to the FM manager involved in facilities' use and maintenance (Tolman and Parkkila, 2009).

Hence, since the process of PM is mainly determined by the metric of a number of indicators, which include both financial and non-financial performance indicators (Yang et al., 2010), the definition of performance metrics is of a high importance. A PM framework is a complete set of performance measures and indicators derived in a consistent manner according to a prior set of rules or guidelines (Brown and Devlin, 1997). The frameworks help to measure whether the functions and departments, based on the defined indicators, are doing the right thing and whether they are doing them well (LynchandCross, 1991).

In this section, a summary of some previous studies of PM Models in the FM industry and their respective measures is presented, these measures will be combined and used latter in chapter 5 to form part of the proposed framework.

1. BSC Measures(Amaratunga,2004)
2. EFQM Measures/TQM
3. Abdulrahman (2010)
4. Hudson et al., (2001)
5. Liyanage and Egbu (2008)
6. Lavy et al. (2010)
7. Principle of Management-by-variance by Hinks and McNay (1999)
8. KPIs used in various sectors by Loosemore and Hsin (2001)
9. Important Performance Indicators by Meng and Minogue (2011)

2.4.4.1 Amaratunga (2004) -Based on BSC perspectives

Amaratunga (2004) examined the practice of PM in FM by looking into the advantages and disadvantages in the current PMSs in order to develop a conceptual framework;

Amaratunga et al. (2004) contend that FM's needed to have a clear idea of customer targets and should select critical success factors and outcome measures for those targeted segments: (i) quality of services received; (ii) timeliness of delivery of services; and (iii) degree of partnership/communication from the FM team.

Table 17 Amaratunga 2000-2004 (Balanced scorecard)

Amaratunga 2000-2004 (Balanced Scorecard)	Internal Processes	Contract management
		Operational efficiency
		Supply chain management
		Work Environment
		Risk Management
		Workforce and Teamwork Management
		Capital Asset management
		Facilities management culture
	Learning and Growth	Innovation
		Strategic facilities information
		Knowledge Resources
		Staff training and development
	Customer	Service partnerships
		Quality
		Timeliness
	Finance	Financial resource Management
		Cost efficiency
		Profitability
		Asset utilisation
		Procurement strategies

2.4.4.2 Abdulrahman (2010)

Abdulrahman (2010) collected performance measures from literature and synthesis of different authors' work including :Gaddis (1959), Ashley *et al.* (1987), Pinto (1991), Kometa *et al.* (1995), Shenhar *et al.* (1997), Pinto (2007) and Muller (2009), he combined the measures and propose the framework measures as presented in below table:

Table 18 Abdulrahman (2010)

Abdulrahman (2010)	Enabler / Drivers	Project efficiency	Time
			Budget
			Quality
			Safety
			Transfer of technology
	Results	Impact on the customer	Customer satisfaction
			Supplier satisfaction
			Team satisfaction
			Productivity
		Business success (benefits to end users, to the clients	service quality
			End-user satisfaction
			Customer satisfaction
		Creating new business and new prospects	Whole life cost
			Flexibility to users
			Reoccurring business

2.4.4.3 Hudson et al. (2001)

Hudson *et al*. (2001) proposed six types of performance measures that can be seen to cover all aspects of business: quality, time, flexibility, finance, customer satisfaction and human resources, as shown in the below table. They had founded their contribution on the previous studies namely the one provided by Sink and Tuttle (1989) and some other types of performance measures that have been published in literature. They generally encompass the quality, productivity, efficiency and effectiveness (Harper, 1984; Sink and Tuttle, 1989; Brown et al., 1994; Coetzee, 1998; Hudson et al., 2001), the human resources dimension, namely customer, employee (Kaplan and Norton, 1992; Cupello, 1994; Brown et al., 1994; Wordsworth, 2001; Neely, 2002; Atkins and Brooks, 2006) and also supplier (Cupello, 1994). Hudson et al. (2001) merged them into six types of performance measures covering all aspects of business: quality, time, flexibility, finance, customer satisfaction and human resources, as shown in the below table.

Time, quality and flexibility provide the financial results and the operating performance. Customer satisfaction reflects the way the company is perceived externally, whilst the human resource helps the managers to evaluate the cultural aspects of their working environment. These dimensions are not prescriptive, and they are intended to encourage the consideration of these areas when developing performance measures to support the organisation's strategies (Myeda, 2013).

Table 19 Hudson et al., (2001)

Hudson et al., (2001)	Kaplan,1983; Lynchand Cross, 1991; Schmenner and Vollmann, 1994; Neely *et al*., 1995;Collier, 1995; White, 1996; Laitinen, 1996; Slack *et al*., 1998; Medori Steeple(2000)		Customer satisfaction
			Human resources
		Quality	Product performance
			Delivery
			Reliability
			Waste
			Dependability
			Innovation
		Time	Lead time
			Delivery
			Reliability
			Process time
			Productivity
			Cycle time
			Delivery Speed
			Labour Efficiency
			Resource Utilization
		Flexibility	Manufacturing
			Effectiveness
			Resource Utilization
			Volume
			Flexibility
			New product introduction
			Computer systems
			Systems
			Future growth
			Product innovation
	Keegan *et al*., 1989; Sink and Tuttle, 1989; Eccles, 1991; Kaplan and Norton, 1992; Jones *et al*., 1993; Meyer, 1994; Bitici, 1994; Fitzgerald and Moon, 1996; Ghalayini *et al*., 1997	Finance	Cash flow
			Market share
			Overhead
			Cost reduction
			Inventory
			Performance
			Cost control
			Sales
			Profitability
			Efficiency
			Product cost reduction
		Customer Satisfaction	Market share
			Service
			Image
			Integration with
			Customers
			Competitiveness
			Innovation
			Delivery
			Reliability
		Human Resources	Employee relationships
			Employee involvement
			Workforce
			Employee skills
			Learning
			Labour efficiency
			Quality of work –life
			Resource utilization
			Productivity

Source: Hudson et al., (2001)

2.4.4.4 Performance Management Framework by Liyanage and Egbu (2008)

Liyana and Egbu (2008) have proposed a PM framework that can be used for FM service in the healthcare sector. The performance metrics proposed are control of HAI, organisation policy, service levels and standards. In general, the performance metrics and indicators aim to ensure that the effectiveness of work is achieved and the importance of communication, particularly in the control of HAI and service levels, is agreed. The indicators are also more focused on the quality control and standard. Emphasis is on the management control of the proposed metrics, specifically on the clarity, appropriateness, implementation control and also defined roles and communication among the employees
Liyanage and Egbu (2008) have proposed a Performance Management Framework (PMF) that specifically focuses on the control of Healthcare Associated Infections (HAI) in FM. The proposed PMF also integrates the performance goals and indicators with other hierarchical levels, namely departmental, hospital, trust/board and national level.

Table 20 Performance Management Framework by Liyanage and Egbu (2008)

Performance Management Framework by Liyanage and Egbu (2008)	Control	Awareness among staff
		Effective communication of changes
		Effective implementation of changes
	Organisation and Policy	Roles and responsibilities are clearly defined
		Adherence to policies
		Policies clearly defined and communicated to the staff
		Appropriateness of policies
		Necessary amendment and revision of policies
	Service Levels	Appropriateness and suitability of service levels
		Necessary amendment and revision on a regular basis
		Communicated effectively to all staff
	Standards	Appropriateness and suitability of standards
		Necessary amendment and revision on a regular basis

*2.4.4.5 **Key Performance Indicators (KPIs) by Lavy et al. (2010)***

Lavy et al. (2010) have possibly introduced the most comprehensive PM framework of all, by identifying the appropriate KPIs for specific FM services. In this approach, the

indicators are proposed together with the measurement units in order to provide a holistic performance assessment. Lavy et al. (2010) attempted to identify KPIs and categorize them based on specific aspects of facilities services in order to facilitate a holistic performance assessment. They proposed four performance metrics, namely financial, functional, physical and survey-based, which they believe are important in delivering a FM service. The financial indicators range from utility cost, operating cost, deferred maintenance and deferred maintenance backlog, and also churn rate and churn costs. Functional performance metric focuses on the indicators pertaining to the productivity, parking, utilization and adequacy of space, employee or occupants, turnover rates, mission and vision, and Mission Dependency Index (MDI). Physical metric has 10 indicators that are dedicated to the physical and performance evaluation, including the specification of FM services such as waste, security and others. Survey-based metric concerns the participation in and satisfaction of the services from customer or building occupants, appearance, and also making sure that the environment of the building is provided to suit the learning and educational appropriateness.

Table 21 Key Performance Indicators (KPIs) by Lavy et al. (2010)

Key Performance Indicators(KPIs) by Lavy et al. (2010)	Financial	Operating costs
		Occupancy costs
		Utility costs
		Capital costs
		Building maintenance cost
		Capital renewal
	Functional	Productivity
		Space Utilization
		Turnover rate
		Mission and Vision and Mission Dependency Index (MDI
	Physical	Indoor Environment Quality (IEQ)
		Building physical condition
		Building Performance Index (BPI)
		Resource consumption- energy use, waste, materials
		Health and Safety
		Security Site and location
	Survey-based	Customer/ buildings/ occupants' satisfaction with products or services
		Community satisfaction and participation
		Learning environment educational suitability and appropriateness of facilities for the function

2.4.4.6 Principle of Management-by-variance by Hinks and McNay (1999):

Hinks and McNay (1999) were among the first to develop a PMS. Their proposed PMS was based on the management-by-variance principle. They proposed the four main performance parameters, namely business benefits, environment, change management, and general, with respective measures. The study also emphasised prioritising the indicators, which correlated the views from customers and premises. They have introduced the proposed output on KPIs, which they believe should overcome the lack of generalised KPIs for FM services.

The indicators for business benefits are aimed at making sure that the services contribute to the monetary value, and provide a suitable functional development environment, and that the failure of premises' services do not contribute to the business loss. Similarly, the indicators for environment performance metrics are on providing a safe environment and satisfactory working conditions.

Table 22 Hinks and McNay (1999)

Hinks and McNay (1999	Business Benefits	Value for money
		No loss of business due to failure of premises' services
		Suitability of premises and functional environment
	Environment	Satisfactory physical working conditions
		Energy performance
		Provision of safe environment
	Change Management	Effective communication
		Quality of end product
		Responsiveness of contractors to changes/requirements
		Achievement of completion deadlines
		Completion of project to customer satisfaction
	General	Responsiveness to problems
		Customer satisfaction
		Management information
		Professional approach of premises' staff
		Competence of staff

2.4.4.7 ***KPIs used in various sectors by Loosemore and Hsin (2001)***

Loosemore and Hsin (2001) have explored the relationship between FM and core objectives by examining the KPIs used the measurements listed for the government sector are grouped from performance metrics, indicators and attributes' levels with a

combination of both financial and non-financial metrics. They broadly tackled the topic of customer satisfaction in FM, denouncing the fact that "most methods of measuring property performance are introspective and do not have customer focus". Loosemore and Hsin, 2001 claimed that there is an apparent lack of sophistication of customer performance measurement within FM. The customer performance process should be a two-way process as the FM provider delivers a service to the customer, in which the customer then feeds back their satisfaction with the service delivered. Hence, there are two levels of performance achieved through: (1) service delivery performance (FM provider to customer); and (2) customer satisfaction performance (customer to FM provider). It is about examining the customer's perceptions of the efficiency and importance of FM services they receive.

Table 23 Loosemore and Hsin (2001)

Loosemore and Hsin (2001)	Customer Satisfaction	Delivery performance (consistent on time delivery)
		Cares about customers
		Friendly service by knowledgeable staff
		Easy to use products and services
		Value for money
	Financial	Net profit
		Revenue growth
		Ordinary dividends
		Return on average assets
	Non-Financial	Productivity growth
		Cumulative labour productivity
		Human resources

2.4.4.8 Important Performance Indicators by Meng and Minogue (2011):

Meng and Minogue (2011) have conducted a survey of 73 companies with the aim of identifying the most important performance indicators used by them. Based on the Performance Model principle, the study suggests 10 important performance indicators, namely client satisfaction, cost-effectiveness, response time, service reliability, health, safety, environmental compliance, staff commitment, client-service provider relationship and IT application. The performance measures or indicators were formulated from the body of literature and results from the expert Interviews.

Meng and Minogue (2011) compared empirically the effectiveness of four main existing models in FM practice. Based on the empirical data from a questionnaire survey and a series of expert interviews in the UK, three commonly used models were retained: the benchmarking, the Balanced Scorecard (BSC) and the Business Excellence Model (BEM).This can be justified by the fact that the proper selection of performance indicators is very important to the measurement and improvement of FM performance.

Table 24 Meng and Minogue (2011)

Meng and Minogue (2011)		KPIs Measures in PM	Client Satisfaction
			Cost-effectiveness
			Response time
			Service reliability
			Health
			Safety
			Environmental Compliance
			Staff commitment
			Client-service provider relationship
			IT application

2.4.5 Performance Management Models Summary

All the PM studies mentioned above focused on the implementation of PMS. In general, they aimed to identify the most suitable performance measures. This shows the growing interest in understanding the practical application of performance measures in service delivery industry.

The study of the academic literature identified on frameworks developed by various authors, as summarized in table 25, table 26 and table 27 shows various concepts and approaches were used in these studies:

Table 25 Previous studies in FM Performance Measurement Models (1)

	Amaratunga (2004)	EFQM	Abdulrahman (2010)
Aim	To propose a performance management model for FM industry based on the balanced scored card criteria	To assess company's business excellence by identifying deviations of performance against the best practice	To propose a performance measurement framework in education sector
Emphasis	This study contributes to the area of performance measurement in the facilities management organisations.	Based on a static design, contrary to BSC and contains a set of standards and strategic objectives, which can be, according to EFQM, implemented in every industry	Combined the performance measures from literature and experts inputs and propose the framework measures
Findings	The research uncovered performance measurement constructs in FM which could be categorised under the following four broad perspectives: customer, FM internal processes, FM learning and growth and financial FM	EFQM is a non-prescriptive framework based on nine criteria. Five "Enablers" and four "Results"	The study contributes a comprehensive performance measurement framework structured around two performance perspectives (performance drivers and performance results)
Output	Performance Management Model with four perspectives	Organisational assessment model for the European Quality Award	Performance Management Framework
Comments	FM is seen to be able to contribute to performance in: strategy, control of resources, service efficiency, supply chain management and value for money.	It is not strategic management tool and many organisations mainly adopt it for the award purpose, with less focus on the improvement process	The proposed framework focused on the education sector only and was not generalized to other sectors

Table 26 Previous studies in FM Performance Measurement Models (2)

	Hudson et al., (2001)	Liyana and Egbu (2008)	Lavy et al. (2010)
Aim	To identify multi-dimensional performance management criteria	To propose a framework for PM in FM services in hospitals	To identify KPIs and categorize them based on specific aspects of facilities services
Emphasis	The PM framework measures should be relevant, clearly defined, and simple to understand, easy to put into practice and aligned with the organisation's goals and objectives	Providing plausible solutions for the control of HAI	To facilitate a holistic performance assessment
Findings	Proposed six types of performance measures that can be seen to cover all aspects of business: quality, time, flexibility, finance, customer satisfaction and human resources	Performance results were used by the case studies samples as a reporting mechanism and not to manage their performance level	None of the existing KPIs were categorized properly
Output	Multi-dimensional Performance Management Framework	Performance Management Framework	Categories and definition of KPIs
Comments	The proposed dimensions are not prescriptive, and they are intended to encourage the consideration of these areas when developing performance measures to support the organisation's strategies	Measures are appropriate but not thoroughly defined and formulated like a checklist The frameworks are not specific and no presentation of domestic service measures is shown	Sub indicators proposed for each of the main indicators are comprehensive but they are mainly being described and not being given attributes or specific metrics

Table 27 Previous studies in FM Performance Measurement Models (3)

	Hinks and McNay (1999)	Loosemore and Hsin (2001)	Meng and Minogue (2011)
Aim	To overcome the lack of generalized sets of KPIs	To explore the relationship between FM and core objectives by examining the KPIs used	To identify the most important performance indicators
Emphasis	Prioritizing the indicators which correlated the views of customers and the premises	Understanding the relationship between FM and core objectives by looking at the KPIs in practice	Understanding the real effect of existing models in the FM sector
Findings	The revised KPI list and priorities ranked by the practitioners	Most respondents did not benchmark their facilities' performance and had little knowledge of corporate KPIs	Most respondents find KPI to be the most successful tool in measuring performance
Comments	The final revised KPIs are brief but were selected by the practitioners The proposed set is lacking in detailed attributes for each indicator	Lists of KPIs presented for each sector are not detailed, which is believed to be due to the data collection not being thoroughly conducted	The study was mostly on the comparison of performance measurement models and gives little exploration on the performance indicators

2.4.6 Summary

This section described the link between PM and FM, two scopes already covered in the earlier chapters. A variety of PM models from previous studies were introduced, to give an overview of the PM models that have been established in the FM services.

Based on the literature, it can be concluded that the FM requires a comprehensive Performance measurement approach to comprehend the interface between the physical workplace and people. It is recommended to emphasize on the measures needed to study the strengths, weaknesses, the significance of the services provided, and also understand the components to ensure a quality improvement and continuous improvement in the FM organisations.

Each of the studies described above provides different findings and output on their proposed set of frameworks, which they believe are appropriate and practical for FM services. This study has referred to the proposed performance measures, indicators and attributes in proposing a set of performance measures. These measures will be combined and used in chapter 5 to develop the conceptual performance measurement framework.

The following section summarizes the main gaps in literature with regards the PM in the FM and draws the lack in the PM designs and implementations reviewed in the literature.

2.5 Gaps in the literature

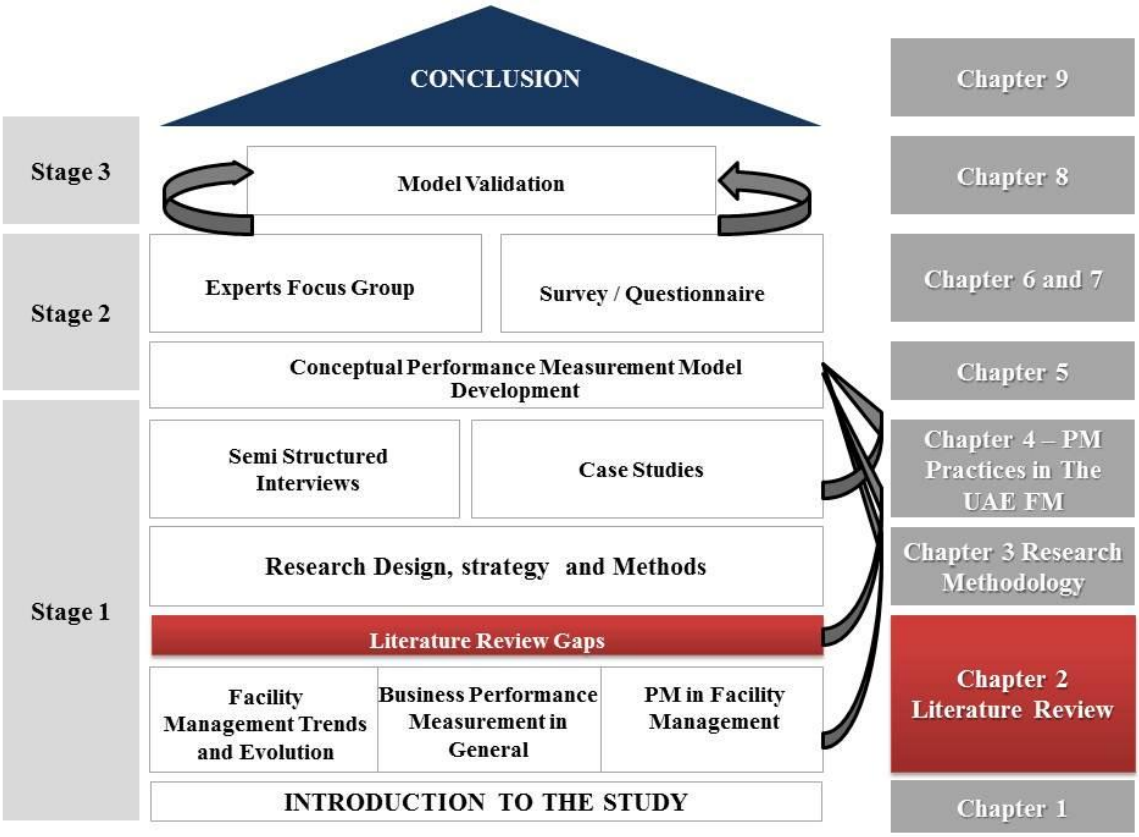


Figure 25 Research Structure- Literature Review Gaps

From the literature review, several gaps in the theory emerged, providing some potential research areas. Although performance measurement concepts are referred to in the FM literature, they have not been applied with the same rigour as with other areas, such as production and construction.

The critical observation of FM practices in general and in performance in particular, allied to a careful reading of the literature, suggest the critical need to determine, verify and integrate the models used by the FM organisation. Moreover, it shows that, there is also a lack of an appropriate set of performance measures that can be used by FM practitioners in the industry. The literature review for this research has also shown that FM industry in the UAE is still immature and in need of a step forward to be as competitive as other FM industries globally. This has driven this research to endeavour to discover and comprehend the effective key PM elements in measuring FM service performance.

2.5.1 Need for an Integrated PMS for FM Organisations

The significant functions of PM in maximising the efficient productivity of organisations' service delivery have been acknowledged and proven globally. However, there is still a gap in the scope of PM in FM, especially in the UAE, whereby its concept is still not as well developed as it is in other industries.

The existing studies tackled the establishment of various performances models and the introduction of their concepts into the FM discipline. However, none has evaluated the UAE Market, a leading market in the FM in the Middle East and North Africa Region and examined the effectiveness of the application of these models.

Even though the BSC has gradually gained popularity and has been adopted by FM practitioner's and applied as a concept in some conceptual framework such as Amaratunga and Baldry performance measurement adopted for the FM performance in higher education properties, it has its shortcomings. The four perspectives are nowadays insufficient to cover all performance perspectives (Neely and Bourne, 2000; Bassioni et al., 2004). For this reason, some BSC-related models have gone beyond the definition of four perspectives. Brackertz (2006) defined six perspectives of facility performance – service, physical, community, financial, utilization, and environmental.

Another shortcoming is the lack of basic guidelines for selecting performance measures or method for setting targets to measures.

In parallel, the EFQM provides the organisation with (1) a multidimensional assessment by means of nine criteria, and (2) a detailed causality structure described by means of a cause and effects chain (Dror, 2008). A fundamental difference among these structures is that while the Balanced Scorecard, although implying a causal system hierarchy, is solely performance-oriented, EFQM emphasize cultural changes in the management of an enterprise (new leadership as a driver), using input variables in terms of system constructs and output variables in terms of operational and business results.

A comprehensive performance measurement system shall include a set of additional performance metrics related with new technologies (big data contribution, sustainability, CSR initiatives) which impacts the community and the welfare of the facility occupants.

The world of facilities management is not a particularly advanced one when it comes to information technologies (Simoes et al., 2011). The literature pointed computerized maintenance management systems that included many of the features needed to support the maintenance performance measurement system (Labib, 2004). However, typical software does not support important features, such as failure reports, which are specific to maintenance functions.

Few authors, namely, Schmitz and Platts (2004), and Forsland (2007) criticized the scarcity of theoretical literature and research on inter-organisational performance measurement. Most of the researches focused on the intra-organisational performance measurement, neglecting the importance of how companies use performance measurement to manage their relationships with their suppliers or customers. Including the customers 'expectations in the measurement system is essential to create satisfied customers (Sharma et al., 1995). Forsland (2007) attempted in her research paper to define a logistics performance management model tools encompassing multiple service metrics related to logistics, such as lead time and on-time delivery, promised lead time, availability of delay information, accurate orders, etc.…

The FM companies need then a performance management framework specifically designed to take into account the dynamicity of the market, the technology advancements, the innovation, and the continuous improvement on their technical expertise (Tuveson and Hodges, 2012). As of now, the FM performance assessment tools used around the world are mainly based on quality measurement systems designed to measure product quality and improve process engineering. These measurement systems include BSC (Balanced Scorecard), TQM (Total Quality Management), Six Sigma, ISO (International Standards Organisation), and EFQM (European Foundation Quality Management). While quality based frameworks generally focus on driving process improvement to enhance product quality and generate cost savings, the BSC emphasizes on the link between strategy and performance measures whereas the EFQM orients on fixing quality defects and improves the gap to organisational excellence.

Recommending a performance management framework combining more than two performance measurement tools will bridge the gap identified in the literature review. Neely et al. (1997) recognized the need to use multi-dimensional measures to obtain a balanced view of the business. The framework should hence after include quantitative and

qualitative performance measures which are induced from the empirical world and given by the FM experts and practitioners

2.5.2 Literature Review Summary

The facilities management Industry needs a proper and valid performance management tool that will enable a control and planning, change management, business units' resource utilization and motivation (Sinclair and Zairi, 1995). The PM model shall take into account new performance factors that are impacting the organisational performance such as the technology, the sustainability and the corporate social responsibility initiatives, as the business atmosphere is quite green more than lean nowadays. Kamaruzzaman *et al*. (2013) have signified the importance of PM in measuring the FM services as the FM shall focus on constant evaluation of performance to guide management decisions and indeed enhance innovative quality delivery that is cost effective (Myeda and Pitt, 2013). PM in FM is perceived in two ways: as a critical success factor in the strategic development process and as a learning process within the FM organisation (Amaratunga, 2000) as the PM helps the FM managers to assess their actual plan versus their desire one in order to achieve an optimum FM service delivery (Rose, 1995).

The next chapter displays the research paradigm on which the researcher positions its knowledge inquiry. It presents the triangulation based research methodology methods (qualitative and quantitative) adopted in order to obtain the integrated and comprehensive performance measurement framework he is looking for.

Chapter 3 – RESEARCH METHODOLOGY

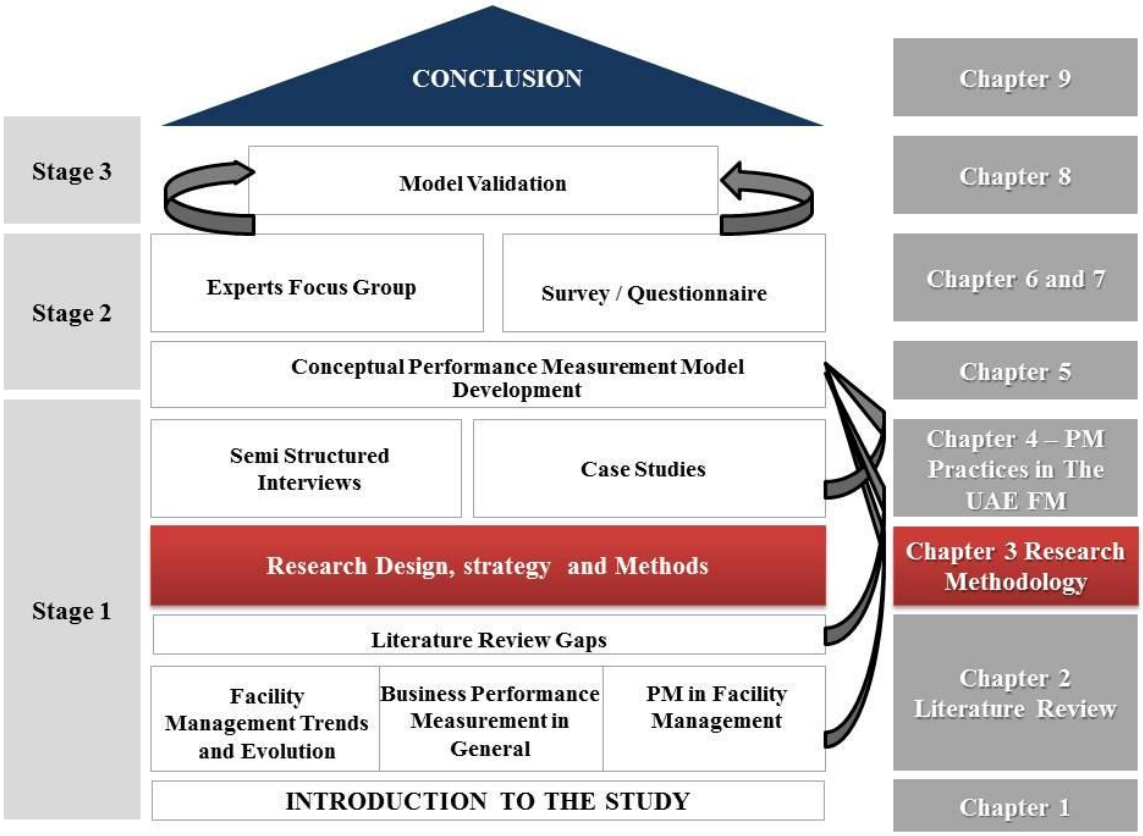


Figure 26 Research Structure - Chapter 3 Research Methodology

3.1 Introduction

The previous chapter reviewed the existing literature on performance management systems in general and in the facilities management industry in particular.

The third chapter, as indicated in figure 26, is the Research Methodology chapter, this chapter defines the methodology used to achieve the research objectives. The literature on theories and concepts of methodologies were presented first. Then, the researcher displayed the selected research design for the study including the research methods and strategies of data collection and analysis adopted. This will allow a better understanding of the researcher positioning and of the approaches and methods selection drivers. During the research journey, several decisions need to be taken: from the philosophical worldviews assumptions to the procedures of inquiry (called research designs) and specific research methods of data collection, analysis, and interpretation.

3.2 Research purpose, paradigm and philosophy

3.2.1 Research purpose

The research purpose is the reason why the research was conducted. As shown in table 28, research purposes can vary among exploratory, descriptive and explanatory (Saunders et al. 2009), or a combination of both exploratory and descriptive for instance (Collis and Hussey, 2009).

3.2.1.1 Exploratory research

Exploratory research is a valuable way of finding out "what is happening", to seek new insights, to ask questions and to assess phenomena in a new light" (Robson, 2002).The researcher applies this type of research when he wishes to clarify his understanding of a problem: he proceeds by looking into existing literature, interviewing 'experts' in the subject and conducting focus group interviews (Saunders et al., 2009).

3.2.1.2 Descriptive research

Once the groundwork is established, the newly explored field needs more information. The next step is descriptive research. This type of research is considered as the extension to the exploratory research (Robson, 2002), and is defined as attempts to explore and explain while providing additional information about a topic. This is where research is trying to describe what is happening in more detail, filling in the missing parts and expanding our understanding.

3.2.1.3 Explanatory research

Veera et al. (2008) affirm that the explanatory research is a continuation of descriptive research: "the researcher goes beyond mainly describing the characteristics, to analysing and explaining why or how the phenomenon studied is happening". The researcher uses theories or at least hypotheses to explain for the causing factors of a certain phenomenon, to control the variables and explain better the causal links between the characteristics (Saunders et al., 2009).

The research aim and objectives indicated that this study is mainly exploratory and descriptive; it started with literature review of facilities management and performance measurement models used in this field. Then a series of semi structured interviews and

relevant case studies served to provide an insight on the performance measurement practices in the UAE FM organisations. The findings of the literature review and the exploratory interviews along with the findings of case studies conducted on three FM service providers were then used to develop the proposed PM model that focuses on the facilities management features. That was structured and validated by the FM expert's opinions and feedback using qualitative and quantitative methods.

Table 28 A comparison of the Research Purpose

	Exploratory	**Descriptive**	**Explanatory**
Objective	To provide insight and understanding	To describe market characteristics or functions	To determine and effect relationships
Characteristics	▪ Flexible	▪ Marked by the prior formulation of specific hypotheses	▪ Manipulation of one or more independent variables
	▪ Versatile	▪ Preplanned and structured design	▪ Control of other mediating variables ▪ Experiments
Outcome	▪ Generally followed by further exploratory or conclusive research	▪ Gives a detailed picture of organisations individuals or phenomenon.	▪ Causal relationship
Methodology	▪ Expert surveys ▪ Pilot surveys ▪ Case study ▪Secondary data (qualitative) ▪ Qualitative research	▪ Secondary data (qualitative) ▪ Surveys ▪ Panels ▪ Observations and other data	▪ Experiments

Source: Saunders et al., 2009

3.2.2 Research Paradigm

According to Walliman and Baiche (2001), paradigm is a system of thinking, a basic orientation to theory and research. A paradigm is a shared world view that represents the beliefs and values in a discipline and that guides how problems are solved (Schwandt, 2001). It is highly important in academic research for three main reasons identified by Smith (1998). First, it helps the researcher to specify the research methods to be used and allows determining the research strategy (Crowther and Lancaster, 2009). Secondly, it

allows the researcher to evaluate different methodologies and avoid unnecessary efforts. Lastly, it helps to be innovative in selecting new approaches that might be dismissed by other researchers.

Falqi (2011) reports that there are three methodological paradigms associated with management research. They are positivism, constructivism and combined or pragmatic approach.

3.2.2.1 Positivism vs. constructivism

The positivism paradigm is based on realist ontology and objectivist epistemology, and usually takes the form of deductive research, making use of quantitative techniques to test existing theory in order to increase the predictive understanding of a phenomenon (McNeill and Chapman, 2005). In contrast, the constructivism paradigm is based on ontological nominalism and epistemological subjectivism, and takes the form of inductive research making use of qualitative techniques to understand a phenomenon through meanings that people give to them (Bryman and Bell, 2007). This paradigm includes fieldwork, observation, interviews, workshops as well as the researcher's impressions and creations (Seale 1999). Constructivists often address the processes of interaction among individuals who build up subjective interpretation of their experiences toward certain objects (Easterby-Smith *et al.,* 2008) while recognizing that also their own backgrounds shape their interpretation (Saunders *et al.,* 2009). Rather than starting with a theory, researchers generate or develop a theory or pattern of meaning induced from the empirical world and the data collected from the field (Crotty, 1998).

3.2.2.2 Pragmatism

The pragmatic research combines both the positivism and constructivism in the same research (Falqi, 2011). Pragmatists do not see the world as an absolute unity: they believe they have a freedom of choice of the methods, techniques, and procedures of research that best meet their needs and purposes. Therefore, in mixed methods research, investigators use both quantitative and qualitative data because they aim to provide the best understanding of a research problem (Morgan, 2007).

The purpose of this study is to develop a performance measurement model to be used by FM organisations in the UAE. This involves collection and analysis of primary data (positivism), as well as building an understanding of performance measurement and

facilities management status in the UAE through case study interviews (interpretivism). **Pragmatism** therefore describes the philosophical perspective behind this research.

3.3 Research approach

To choose a research approach, a researcher must decide on the research logic that will build the understanding of the phenomena under investigation (Ventuvuori, 2007). There are three types of research approaches: inductive, deductive and abductive.

3.3.1 Inductive approach

According to Gill and Johnson (2010), inductive approach examines the empirical world and then makes hypotheses based on data collection and analysis. It starts with observations and progresses to give the required explanations which are developed in the form of hypotheses or models (Crowther and Lancaster, 2009).

3.3.2 Deductive approach

On the other hand, in deductive approach the conclusions are developed through "logical reasoning" (Ghauri and Gronhaug, 2010). Researchers build hypotheses before examining them empirically to determine their validity (Crowther and Lancaster, 2009).

3.3.3 Abductive approaches

It is rare to find research approach which is solely deductive or exclusively inductive (Locke et al. 2008). Dubois and Gadde (2002) developed an abductive approach which is a combination of the inductive and the deductive approaches. This approach allows the evaluation of old hypotheses and theories and developing new ones based on empirical investigation.

This study adopted an **abductive** research approach because it is neither entirely deductive nor entirely inductive but in between. First stage was an inductive approach aimed to develop the performance measurement model, and then the aim of the second stage was to seek the opinions of experienced experts through a deductive approach.

3.4 Research design

Researchers can choose any of the three types of research design found in literature: the quantitative research design, the qualitative research design or the mixed methods approach. Table 29 includes the main characteristics of the 3 approaches, their strengths and limitations (or weaknesses).

3.4.1 Quantitative research

Quantitative approach provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population (Neuman, 2003). This method includes questionnaires or structured interviews for data collection (Babbie, 1990). The collected data are quantifiable, measurable, can be standardized and easily presented (Sarantakos, 2005). Moreover, quantitative research method can be used to examine the relationship among variables (Creswell, 2009).

3.4.2 Qualitative research

On the other hand, qualitative research consists of detailed descriptions of events, people, interactions, observed behaviours and general opinions (Patton, 1996). In the qualitative approach, researchers engage themselves in a group by examining its people and their interactions (Bogdan and Biklen; 1992), and assigning hereafter meanings to what those individuals attribute to social phenomena (Liu, 2008). The qualitative researcher's objective is to reach an insider's view of the group under study to create the required knowledge (Creswell, 2003). According to Hancock (1998), the main examples of methods of collecting qualitative data are individual interviews, focus groups, direct observation and case studies.

3.4.3 Triangulation research design

The mixed approach, or as called "Triangulation" approach, is based on the concept of combining both qualitative and quantitative approaches. This combination has proven to be more powerful than a single approach (Sherif, 2002) and very effective (Lee, 1991). The main objective of the triangulation approach is to maximize the advantages of quantitative and qualitative research as they are not contradictory in nature or divergent but present different dimensions of the same phenomena (Das, 1983). So, the application

of triangulation is based upon the principle that the weaknesses in one approach will be compensated by the counter balancing strength of the other (Graneheim and Lundman, 2004; Crossan, 2003). This approach enriches the data collection, and improves the reliability and validity of the research outcomes (Gelo et al., 2008). It offers researchers a great deal of flexibility; whereby theories can be developed qualitatively and tested quantitatively or vice versa. In this type of methodology, different methods can be considered: experimental, literature review, focus group workshop, exploratory survey and a case study.

Previous choice of research approach (inductive or deductive) had an influence on the choice of research design , quantitative methods works very well with deductive research approach, and qualitative methods works very well with inductive research approach. Based on this, this research used the triangulations research design. The qualitative methods included the semi-structured interviews, case studies and focus group and expert's feedback and the quantitative method in this study comprised of a questionnaire survey. Figure 27 shows the usage of mixed methods. These methods were explained in details later in this chapter.

Figure 27 Using Qualitative and Quantitative Methods

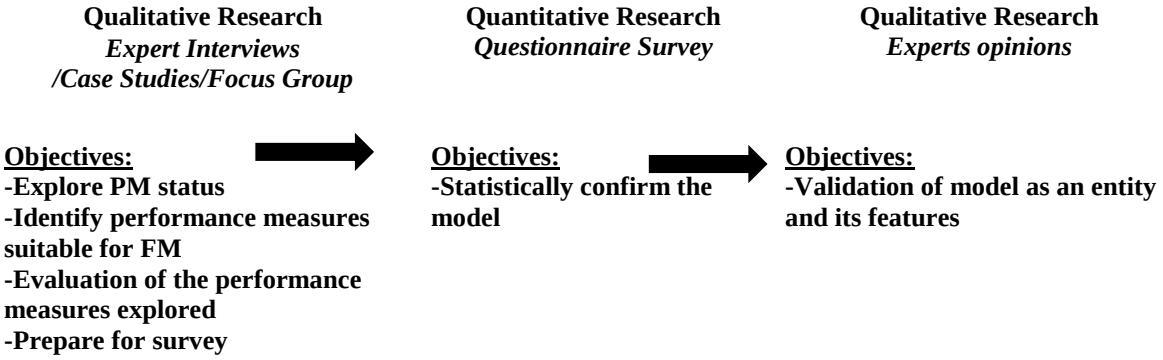


Table 29 The Characteristics of the Types of Research Designs

Dimensions	Quantitative	Qualitative	Mixed Methods
Paradigms	Post positivism; Positivism	Constructivism (and variants)	Pragmatism; transformative perspective
Research questions	Quantitative research questions; research hypotheses	Qualitative research question	Mixed research questions (qualitative/ quantitative)
Form of data	Typically numeric	Typically narrative	Narrative plus numeric
Purpose of research	(Often) confirmatory plus exploratory	(Often) exploratory plus confirmatory	Confirmatory plus exploratory
Role of theory; Logic	Rooted in conceptual model or theory; hypothetico-deductive model	Grounded theory; inductive logic	Both inductive and deductive logic ; inductive-deductive research cycle
Typical studies or design	Correlational; survey; experimental; quasi experimental	Ethnographic research designs and others (case study)	MM designs, such as parallel and sequential
Sampling	Mostly probability (large, random representation)	Mostly purposive (small)	Probability, purposive, and mixed
Data Collection	Experiment, questionnaire, secondary data	Interviews, Case studies, documents	Mix of quantitative and qualitative tools
Data Analysis	Statistical analyses: descriptive and inferential	Thematic strategies: categorical and contextualizing	Integration of thematic and statistical; data conversion
Validity/ Trustworthiness issues	Internal validity; external validity	Trustworthiness; credibility; transferability	Inference quality; inference transferability
Main Strengths	Reliability by critical analyzed Short time frame for administered survey. Facilitated numerical data for groups	View of homogeneous exploration Raise more issues through broad open-ended investigation Understanding of behaviours	Triangulation and verification of data findings Covers all research problems dimensions. Maximize the advantages while minimizes the limitations
Main Weaknesses	No human perception and beliefs Lack of resources for large scale research No depth experience description	No objectively verifiable result Skilful requirements for interviewers. Time consuming during interviewing process and intensive category process.	Time consuming approach Potential disharmony based on researcher bias, Lack of understanding of the reason of implementation.

Source: **(Teddlie and Tashakkori, 20019 – Choy (2014) (adapted)**

3.5 Research Study Process

As discussed in the previous sections, and presented in table 30, this research adopted the **pragmatic paradigm** that combines both the positivism and constructivism, and an **abductive research approach** as it is neither entirely deductive nor entirely inductive but in between. These choices had an influence on the choice of the research design, so the **triangulations research design** was adopted. Based on this, the data was collected using the **qualitative methods**: semi-structured interviews, expert's opinions, case studies and the focus group workshops and the **quantitative method**: questionnaire survey.

Paradigm / Epistemology Worldview			
Pragmatism	**Research Methodology**		
(Constructivism + Positivism)	**Approach**	**Methods**	**Data Collection Techniques**
	Inductive	Qualitative	Literature Review
	Inductive	Qualitative	Semi structured interviews
	Inductive	Qualitative	Case studies
	Inductive	Qualitative	Focus Group
	Deductive	Quantitative	Questionnaire – Survey

Table 30 The Pragmatism Paradigm Framework of this study

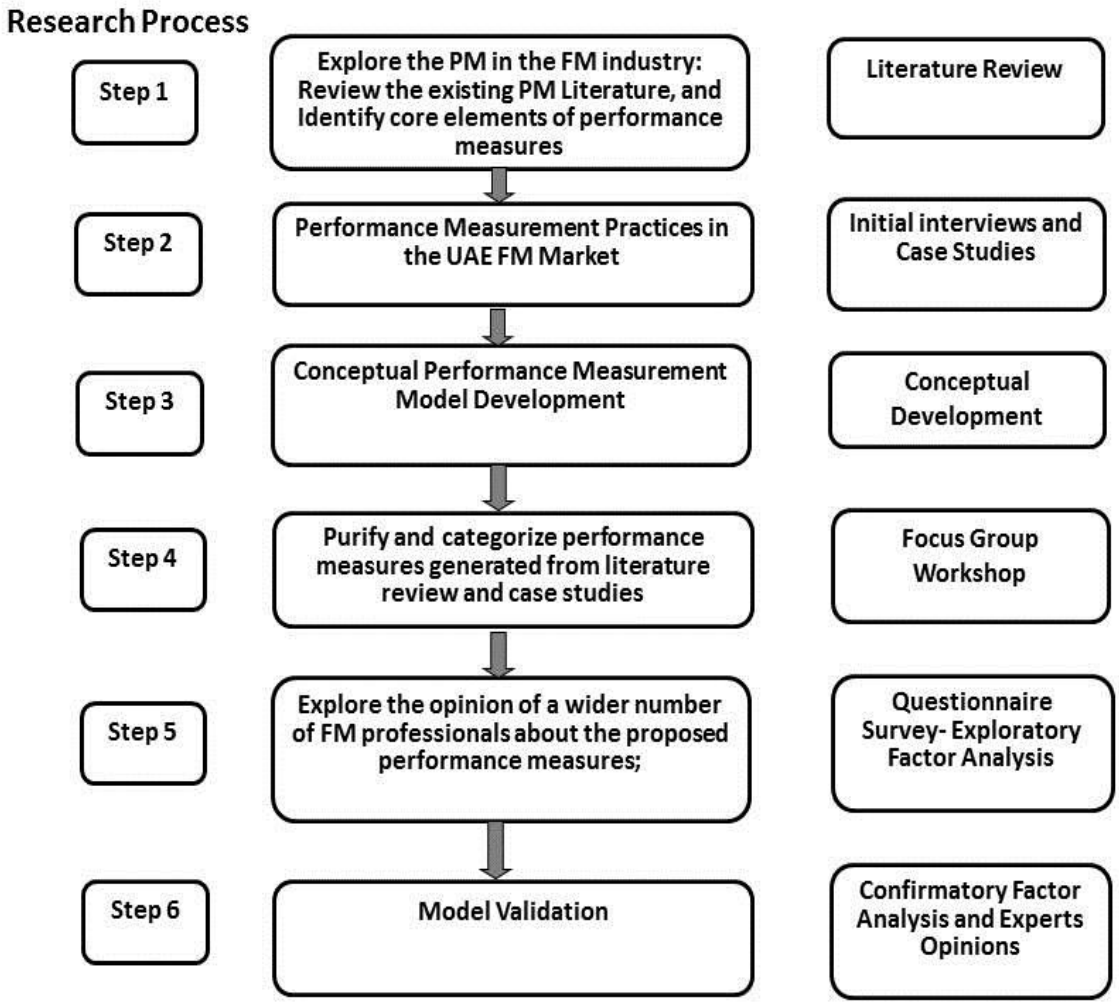
The methods used were linked to research objectives presented in table 31; this table shows that objectives were achieved by using mixed data collections methods that were discussed in details in the next sections.

Research Objectives	**Methods**
Objective 1: To identify and assess the performance measurement models used in different sectors	Literature review
Objective 2: To review the FM scope, structures, models and evolution, with a specific focus on the UAE	Literature review and semi structured interviews
Objective 3: To explore the current performance measurement systems in the FM industry, and review how performance is measured in the FM organisations in the UAE	Literature review, semi structured interviews and 3 case studies
Objective 4: To identify and evaluate the performance measures and criteria that defines the successful FM Organisation	Literature review, semi structured interviews, 3 case studies and focus group
Objective 5: to develop a model based on the outcomes of the above objectives that measure the performance of facilities management organisations	All of the Above and questionnaire survey with exploratory factor analysis (EFA) using SPSS
Objective 6: To evaluate and validate the proposed Performance Measurement Model	Experts feedback and confirmatory factor analysis using AMOS

Table 31 Research objectives and the methods

Accordingly a schematic of the actual research process was illustrated and presented in figure 28. This figure shows that the research process consists of the below **6 steps** that was discussed in details in the following sub-sections.

Figure 28 Research process



1. Conduct a **literature review** to explore the current performance measurement and management issues, and analyse the gaps in knowledge especially in the UAE market through semi structured interviews;

2. Exploring the performance measurement practices in the UAE using semi-structured interviews and case studies.

3. **Theoretically develop the conceptual PM model** that can enhance performance management experience and monitoring within the FM industry by leveraging on the literature review and case studies findings;

4. Modify the model based on the **Faculties Management experts' focus group** workshop;

5. Conduct a **questionnaire survey** (quantitative method) to explore the opinion of a wider FM Sector to confirm and adjust the proposed model, Factor analysis with SPSS statistical software were used to help in the data analysis;

6. **Evaluate and validate** the model via a questionnaire survey output using confirmatory factor analysis (CFA) analysis (with the help of AMOS software), and experts feedbacks through a questionnaire

A description of each step is discussed in the following sub-sections.

3.5.1 Step One: Literature Review:

Literature review is concerned with reviewing established theories, findings from other research and particular applications of theory (Fellows and Liu 2003). The literature reviewed for this research was conducted to explore the current performance measurement and facilities management issues, and to analyse the gaps in knowledge especially in the UAE market, this was linked to objectives #1 and covered in Chapter 2.

Literature review consisted of three parts presented in table 32:

1. Evolution of the facilities management industry, trends, special characteristics that distinguish the FM service provider from any other organisation.
2. A theoretical review of the concept of corporate performance management, its importance and the key models applied in practice and their limitations.
3. An overview of the performance measurement models and models especially designed for the facilities management industry, their main metrics and features.

LITERATURE REVIEW- Performance Management System and its implementation in the FM industry		
PART I : Evolution of the Facilities Management Industry	**PART II : General Business Performance Measurement**	**PART III: Performance Measurement in the FM industry**
1. Definitions of Facilities Management 2. Scope of FM Services 3. FM Growth and Development 4. Facilities Management History: Past, Present and Future 5. Facilities Management Generations 6. FM Business Outsourced Agreement or Structures 7. FM Spectrum: Business Management Models and Structures 8. Facilities Management Contributions 9. The FM practices in the United Arab Emirates	1. General Need for an Organisational Performance Assessment 2. Performance Measurement Concept 3. Performance Measurement Evolution throughout History 4. The Development of Performance Measurement Model/ System 5. Approaches of Performance Measurement Model 6. A successful Effective Performance Measurement Model 7. Performance Measures Criteria 8. Challenges in the PMS Development and Implementation 9. Transition from Performance Measurement to Performance Management 10. Realizing Strategy through Measurement of Balanced Perspectives 11. Review of the Key Multi-Dimensional PM Models	1. The Rationale of Measuring FM Performance 2. The role of Performance Measurement in Facilities Management Organisations 3. Performance Management Models and their respective measures in the FM industry

Table 32 Literature Review Contents

A critical review of research journals, conference papers, articles, books, and websites and business reports relevant to the objectives of the research study.

3.5.2 Step Two: Performance Measurement Practices in the UAE FM Market

It was noted during conducting the literature review (previous step), that there is a gap in literature regarding the implementation of performance measurement systems in the FM organisations in the UAE. Based on this it was decided to use two qualitative data collection methods to explore more information on this subject: the initial expert's interviews and case studies, these methods were linked to objectives 2 and 3, and covered in Chapter 4.

3.5.2.1 Step Two A: Semi structured Interviews

Semi structured interviews are very helpful in any exploratory study (Robson, 2002) as they can explore and explain existing contexts and open new insights that emerge from the interviews and which cannot be provided by the questionnaire (Saunders et al., 2009; Tashakkori and Teddlie, 2003). These interviews seek to establish an in-depth understanding of the experiences of the respondents and the interpretations of a particular action, process, or event (Saunders et al., 2009).

3.5.2.1.1 Rationale for choosing Interviews method:

Considering research objectives #2 and #3, which include the investigation of the facilities management industry status in the UAE, and the current implementations of performance measurement systems in this industry, and due to the significant lack in studies and literature regarding the UAE market, an exploratory study has been initiated by adopting the semi-structured interview method for collection of primary data. Cooper and Schindler (1998) proposed that in the early stage of an exploratory research, where the researcher is seeking guidance, to test ideas, or even to gain ideas about a subject of interest, such approach might be applicable.

Based on this, the purpose of conducting the semi-structured interviews was summarized as below:

a. Gaining an insight on the FM Opportunities and challenges in the UAE
b. Better Understanding of their practices with regards to performance measurement
c. Obtaining additional information from the empirical world / field that has not been discussed in the literature

3.5.2.1.2 Interviewees' profile:

In this study, eight separate interviews were conducted with eight facilities management experts in the UAE, the selected interviewees listed below were from various organisational levels, senior management, and middle management, and from the service providers, clients, and the authorities' sides.

- CEO of a leading UAE FM Service Provider (with > 3000 employees)
- 1 MEFMA Board Member
- GM of FM service Provider (with > 1000 employees).

- 2 FM Directors of large clients : 1 Government client and 1Real Estate Developer
- 1 FM Operations Manager overseeing 5 projects
- 2 FM Managers

3.5.2.1.3 Main Questions covered during the interviews:

The interviews were of open-ended questions concerning their perception of performance measurement systems in order to obtain a sample of current performance measurement in the UAE. All questions were related to facilities management status and the implementation of performance measurement systems. Below are the main questions covered during the interviews:

1. What are the main opportunities and challenges facing the FM industry in the UAE? Fill in the SWOT format
2. Do you have a Performance Management system in place? If yes, what are the main advantages and disadvantages? If not, why?
3. Challenges / Barriers in the implementation of a PMS
4. Do you think there is a need for a PM model specific for FM?

3.5.2.1.4 Semi Structured Interviews Process

The procedure for the interviews was initiated by sending the interview protocol together with introductory letters to the eight participants (ref. Appendix A – Protocol of Interview).

The researcher acted as interviewer, and the interview time was scheduled for 30-40 minutes. The researcher started the interviews with a brief outline on the research. The interview used a semi-structured format so the interviewer can easily ask follow-up questions and get more information based on the responses.

The researcher had also a guide to crosscheck to make sure that all questions were discussed within each interview section. The recording system and the hand-written notes were used during the interviews. For research ethical consideration, the notes of interviews respected the confidentiality of the interviews with no name on the transcripts.

At the conclusion of the interview, the researcher recapped what have been said in a very brief way and asked if the interviewee had any additional information to add.

3.5.2.1.5 Data analysis of interview results

Creswell (2009) asserted that qualitative data analysis involves: preparing data, conducting different analyses, moving deeper into understanding the data, and making an interpretation of the larger meaning of the data. So, based on the type of data collected and the research purpose, qualitative data analysis was used. The data collected were revised and categorized to be linked with the interviews objectives .At the end a summary of findings were presented. The results were presented in Chapter 4.

3.5.2.2 Step Two B: Case Studies

Robson (2002) defined case study as a strategy for conducting research that involves empirical investigation of a certain subject within its real life context using multiple sources of evidences. The main advantages of a case study include richness of data and deeper insight into the phenomena under study (Hancock, 1998). According to Yin (2003) a case study should be used in the research to answer "how" and "why" questions; this method is widely used in organisational studies and across the social sciences for several reasons: (i) researcher becomes deeply involved and get better understanding of the research subject (Hummel, 1977); (ii) it allows the researchers to discuss details and investigate complex settings; (iii) it allows researchers to communicate with participants and hereafter avoid any misinterpretation by questioning deeply to understand the meaning.

3.5.2.2.1 Rationale for choosing case studies method:

Considering research objectives #3 and #4, which include the exploring of the actual implementations of the main performance measurement systems used in FM industry in the UAE, mainly the BSC and the EFQM, and identifying performance measures which can be added to these frameworks. Based on this, the case studies were used to explore through a qualitative method how the performance measurement frameworks and models are implemented and practiced within the UAE FM organisations.

The case study method was chosen because of its advantages in the analysis of organisational phenomena within specific settings (Amaratunga and Baldry, 2001; Eisenhardt, 1989; Patton and Appelbaum, 2003). It allows a better understanding of management systems in practice (Keating, 1995; Moon and Fitzgerald, 1996; Otley and Berry, 1998). Having defined sets of key variables required for developing a performance

measurement system for the FM organisations based on the literature review, the case studies supposed to gain a deeper understanding of the FM organisations practices in the UAE, and their success and challenges stories.

3.5.2.2.2 Case studies organisations' profile:

In this research, three case studies were conducted within three facilities management organisations in the UAE, identified as SOS FM, BHF FM and IDA FM. Table 33 presented a summary of each organisation profile. Actual names of the organisations were not used in any part of the thesis due to confidentiality of the information provided.

	BHF FM	**SOS FM**	**IDA FM**
Geographical Focus	local	Multinational with locally owned	local
Size (staff)	400 Staff	4500 Staff	6100 Staff
Years of experience	7 years	More than 10 years	15 years
Performance model adopted	BSC	EFQM	EFQM and BSC
Client Portfolio	Residential, Retail, Educational, Mixed use, Sports Facilities	Government, Commercial, Residential, Retail, hospitality, Mixed Use, Educational	Government, Commercial, Residential, Retail, Educational, Mixed use, Sports Facilities
Scope of Services	Hard and Soft FM services and FM consultancy services	Hard and Soft FM services	Hard and Soft FM services

Table 33 Summary of case studies' organisations profiles

3.5.2.2.3 Data collection:

The case study approach makes use of multiple methods of data collection such as interviews, document reviews, archival records, and direct and participant observations (Yin, 2003). In this research, the case studies data were collected using semi-structured interviews, review of documents and quality assessor feedbacks.

Reliability in qualitative research being a concern (Creswell, 2009), the researcher paid attention to the background of the interviewees and their position and influence in the organisation. Consequently, the interviews related to these case studies were held with senior managers who are heads of departments, quality managers, directors of business strategy as well as senior project managers.

3.5.2.2.4 Analysis

As indicated earlier, semi-structured interviews and quality reports were used to gather qualitative data from three case study organisations. In this research the below steps suggested by Creswell (2009) were followed to analyse the data collected from the case studies:

- Organised and prepared the raw data (transcribing interviews, documents and quality assessor feedbacks reports)
- Read through all the data to get a general sense of the information
- Started a detailed analysis with a coding process to organize the material into segments before brings meaning to the information.
- Used narrative analysis to convey the findings
- Interpreted the findings and derive a comparison among each case study.

The case studies were developed and discussed in details in chapter 4.

3.5.3 Step Three: Conceptual performance measurement model development

The need of developing a model for measuring the FM performance was well highlighted in literature and semi-structured interviews.

The third step of this research, which was covered in chapter 5, handled the process of formulation of the conceptual PM model, and was divided into two main parts:

1. The design of the performance measurement model. The design process was based on the principles of the existing PM models and frameworks, supported by the primary data collected from semi structures interviews about the need of well-structured model which contains multidimensional criteria and predefined performance measures.

2. The second part concentrated on identifying a list of performance dimensions and measures to be used in the proposed model, identification of these components were done by the combining performance dimensions and measures from relevant literature review, case studies and the existing measurement frameworks and models.

3.5.4 Step Four: Purify and categorize performance measures generated from literature review and case studies -Focus Group

Several content assessment methods have been described in the research methods literature. One common method requires respondents to rank the generated items and categorize them based on their similarity to construct definitions. This can be conducted using experts in a content domain (Hinkin, 1997).Based on this, focus group method was used, and this method was linked to objectives 4, and covered in Chapter 6.

Focus Group Workshop

The focus group workshop method is adopted to gain insights and ideas in an exploratory method, attempting to obtain a consensus with regards a subject discussed (Krueger, 2009). Krueger (2009) explicitly mentioned that focus group to be used when (i) insights are required in exploratory research; (ii) various opinions of a certain subject exist within a group of people; and (iii) when ideas and concepts about an issue to be produced. Morgan (1997) also consents that this method is perfectly appropriate in a research where information about the matter is not much known.

3.5.4.1 Rationale behind this Research Focus Group

Considering research objective #4, which includes the evaluation of the performance measures and criteria explored in the previous stage, there is a need to conduct a content validity to complement the findings of the literature review and case studies by in-depth discussions with practitioners. Based on this, the focus group workshop was adopted to explore the opinions of experts, well knowledgeable professionals as well as highly experienced senior managers who can provide insights about the UAE FM markets and its particularities with regards to the performance measurement needs and challenges.

3.5.4.2 Participants Selection

As depicted by Krueger (2009), the selection of the participants for the focus group is very important because their inputs play a major role in developing the model. Those participants should have the required knowledge and are willing to share it (Bruseberg and McDonagh, 2002). The number of participants in the focus group is very critical. The optimum number of participants in focus group may vary, some suggested having between six and eight participants (Creswell, 2014) while others recognized the value of having up to ten participants (Rabiee, 2004).

In this study seven facilities management professional participated in the workshop, they are considered senior of which designations are shown in table 34 joined the workshop and discussed openly about the performance measurement in the FM field.

Table 34 Participants Profile

Sl #	Designation	Organisation
1	FM Consultant	FM consultancy
2	Operations Manager	Facilities Management Service Provider
3	FM Director	Leading Property Developer Client
4	General Manager	Facilities Management -Service Provider
5	Centre of Excellence Director	Facilities Management -Service Provider
6	Quality Manager	Facilities Management Service Provider
7	Senior Director -Quality and Outsourcing	FM Agent-Client Representative

3.5.4.3 Planning

The planning is crucial for the success of this technique as, in this stage, the researcher decides on the purpose of the study, the use of the information collected, and the selection of the participants, and all the details related such as venue, timing, and set up (Morgan, 1988).

Krueger (1994) mentioned that before conducting the focus group, the researcher should think about the nature of problem, the reason pushing him to adopt this technique, the type of information that to be produced, the importance of this information and how it

will be used later on. Once identified the answers on all the above, the researcher continued on the practical level by selecting the participants, the venue, the incentives that should be put in place to maximize the participation rate, the questions formulation, etc... Moreover, in focus group planning, Krueger (1994) advised to develop a chronological plan as shown in the table 35, including the following main actions to be undertaken:

Table 35 Chronological plan activities

	Focus Group Activities
1	Development of the subjects
2	Identification of the participants' characteristics
3	Drafting a list of the potential participants
4	Recruiting the participants
5	Conduct of the workshop
6	Analysis and composition of the report

Source: Krueger, 1994 (Adapted)

3.5.4.4 Data Collection

This stage consists of the discussion stage and the moderation of the meeting. The participants can be divided in two or three groups based on their number and the topics to be discussed, and workshop generally lasts from 1 to 2 hours based on the complexity of the topic under research, number of questions and the number of participants. It is, therefore, ethical and good practice to warn the participants about their time commitment (Rabiee, 2004). In this research, the workshop took around 3 hours to be completed that is because all the topics were discussed within one group to get the maximum inputs from all parties.

During the workshop, the researcher shall fulfil a moderator role where he creates an environment in which the participants who might not know each other feel relaxed and encouraged to engage and exchange opinions, views and ideas about the topic (Krueger, 1994; Burrows and Kendall, 1997). In addition, the need for a note taker should not be underestimated as he will observe the non-verbal interactions, texts the exchanges of views and the general content of the discussions and note which statement is made by

which particular individual, thereby supplementing the oral text and allowing an integrate analysis of the discussions (Kitzinger, 1994, 1995).

3.5.4.5 Data Analysis

It is known that focus group like any other qualitative research method generates huge amounts in data and long pages of transcripts (Robson, 1993). The researcher main aim is to reduce this amount of data by categorizing them, getting rid of extra and irrelevant information, recombining the evidence and tabularizing them so they can be analysed according to the focus group purpose (Yin, 1989).

Once the raw data has been mechanized, they are ready for mapping and interpretation. Krueger (1994) advised to interpret the coded data into seven criteria: words; context; internal consistency; frequency and extensiveness of comments; specificity of comments; intensity of comments; big ideas (Ritchie and Spencer, 1994).

Full details about the focus group workshops interviews and findings were developed discussed in chapter 6.

3.5.5 Step Five: Explore the opinion of a wider number of FM professionals about the proposed performance

As part of the triangulation method adopted, the quantitative data collection was used to support the qualitative data and to strengthen the issues identified through the qualitative analysis. This step used the focus group outcomes to design a survey questionnaire (quantitative method) used to explore the opinions of FM experts about the proposed performance measures, this method was linked to objectives 4, and covered in Chapter 6.

Questionnaire Survey

A questionnaire survey comes usually after the focus group to complement it in data collection techniques (Morgan, 1997; Langford and Mcdonagh, 2002). Focus groups produce the hypothesis that needs certain verification by a quantitative method like questionnaires (Edmunds, 2000).

Survey research is used to quantitatively describe specific aspects of a given population involving the investigation of the relationships nature among variables, attempting to

generalize to the population the findings obtained from a sample chosen (Kraemer, 1991). Before conducting the survey, the researcher shall conceive a model that identifies the expected relationships among these variables. The survey is then constructed to test this model against observations of the phenomena (Salant and Dillman, 1994).

3.5.5.1 Rational for choosing Survey method:

According to Saunders *et al.,* (2009), survey is a common data collection method in management research and mainly used for exploratory and descriptive research. One of the main strengths of this method is the ability collect large amount of data in a highly economical way. Other advantages of surveys include; collection of quantitative data which can be analyzed quantitatively using descriptive and inferential statistical tools; data collected can help to explain reasons for particular relationships between variables, and produce models of the relationships (Saunders *et al.*, 2009).

Base on this, the research used the questionnaire survey in order to avail itself of the benefits outlined above. So, this method was used as a quantitative method to explore the opinion of a wider number of FM practitioners on the performance measures proposed.

3.5.5.2 Objectives of the Questionnaire

The main objectives of this questionnaire were identified as listed below:

1. To explore the opinion of a wider number of professionals in the Facilities Management sector about the proposed conceptual model performance measures;
2. To establish the measurement model structure in accordance with the analysed data
3. To test the PM model developed by the previous exploratory focus group workshop
4. To use the outcomes in aggregating the different levels of performance perspectives, dimensions, and measures.
5. Validate the Model fit using Confirmatory Factor Analysis

3.5.5.3 Questionnaire Design Process

The design of the questionnaire usually follows a set accepted of principles starting from identifying the questionnaire objectives, to choose the questions including instructions on how to answer questions (Hayes, 2000; Easterby-Smith, 2002).

Before proceeding in the quantitative method survey, the researcher ought to consider the following questions in the checklist (table 36).

Table 36 Checklist of Questions for Designing a Survey Method

Is the purpose of a survey design stated?
Are the reasons for choosing the design mentioned?
Are the population and its size mentioned?
Will the population be stratified? If so, how?
How many people will be in the sample?
What will be the procedure for sampling these individuals (e.g., random, non-random)?
What instrument will be used in the survey? Who developed the instrument?
What are the content areas addressed in the survey? The scales?
What procedure will be used to pilot or field-test the survey?
What is the timeline for administering the survey?
What are the variables in the study?
How do these variables cross-reference with the research questions and items on the survey?

The researcher, as shown in table 36, started by reviewing the purpose of the survey which is usually to generalize from a sample to a population of survey study and the rationale for his selection for the proposed study, then he considered the advantages of this type of methods of data collection and indicated the size of the sample and whether the survey will be cross-sectional or longitudinal (Fowler, 2009).

Levy and Lemeshow (1999) said that the methodology that supposed to be used to select the sample from the population should not be taken too lightly. Based on this, a sampling plan was prepared in which the approach of selecting the sample was described along with the choice of media through which the survey was administered. As for the survey methods, it includes the telephone and face-to-face interviews, as well as mailed surveys using either postal or electronic mail (Salant and Dillman, 1994).

3.5.5.3.1 Choosing Suitable Questions

Once the purpose and the main focus of the study are clearly defined and the objectives translated into measurable factors, the researcher shall ensure that the question wordings survey shall fulfil minimum quality criteria (McIntyre, 1999). First the question wordings must be consistent with the potential respondents' educational level (Salant and Dillman, 1994); the questions and response options are clear to both the respondent as well as the researcher (Fowler, 1995). Survey questions should not be combined where the

respondent may wish to answer positively for one part, but negatively for another. Questions shall be civil and ethical (Fowler, 1995). Personal questions, objectionable statements that reflect the researcher's bias and questions that require difficult calculations should definitely be avoided.

The researcher has the choice of three types of questions: the open-ended questions which require greater thought and contemplation on the part of the respondent to provide precise answers; the closed-ended ones which requires, in contrast, the participant to choose from a given set of responses (McIntyre, 1999) based on likert scale or numerical ranges. This type of questions is the easiest for the respondent to answer and for the researcher to analyze data (Salant and Dillman, 1994).The third type is the partial closed ended question in which the respondent is asked to compare possible responses and select one, or write in "other" (Salant and Dillman, 1994).

Moreover, few more considerations shall be taken into account such as the length of the survey, the avoidance of questions that are too long or that involve double negatives (McIntyre, 1999). Undefined abbreviations and acronyms should not be used (Salant and Dillman, 1994).

McCormack (1997) recognized three styles of questions that are: Behavioural, Attitudinal and the Classification questions, the first used to explore the way the participants act , the second to explore the way participants think ,the third to explore who the participants are.

In this study, the questions styles used were attitudinal and classification questions. The attitudinal questions provide statements to which respondents answer according by stating what they think.

This study used a 10 point scale (form 1: Strongly disagree to 10: Strongly agree) to gather data from the participants who were asked to assess the level to which each proposed performance measure can be used in the Facilities Management industry to measure the performance of the organisation.

3.5.5.4 Questionnaire Results and Data Analysis

Statistical data analysis is mainly adopted in management studies to ascertain the credibility of a theoretical proposed model and to estimate the extent to which the different explanatory factors influence the dependent variable (Coorley, 1978). Isaac and Michael (1997) encouraged the use of automated data collection tools to facilitate data tabulation and manipulation.

The raw data from the respondents were coded to make sure that data is reported easily. They were then analysed using factor analysis which examines the relationships between variables and recognises sets of "constructs" on the basis of similarity of responses that illustrate "underlying dimensions" of the variables (Brace, 2004). Williams et al. (2012) suggested the following five steps for conducting factor analysis, which were followed in this study:

1. Determine the suitability of data for factor analysis
2. Select a factor extraction method
3. Choose an appropriate factor extraction criterion
4. Select a rotational method
5. Interpret and construct labelling

In this research, SPSS software were used to analyse the quantitative data gathered using the exploratory factor analysis, where Principal axis factoring and Varimax rotation was used to establish the structure of the measurement model and uncover the performance dimensions in each perspective and then compared it with the results of focus group workshop. The full details of the questionnaire data exploration and analysis were developed in chapter 7.

3.5.6 Step Six: Model Validation

The final step of this research is the validation of the measurement model, this was achieved by conducting a confirmatory factor analysis (CFA) analysis, and experts feedbacks through a questionnaire; this step was linked to objectives 6, and covered in Chapter 8.

The confirmatory factor analysis process (CFA) was conducted using AMOS software, and the output report generated from this software was reviewed and analysed to evaluate the model fit of the measurement model and to confirm the hypothesized structure.

Moreover, the model was validated using experts' opinions. This included seven experts who are experienced in the facilities management industry and performance management systems. A formal request letter was sent by email to the participants along with evaluation questionnaire (Appendix F). They were asked to rate the feasibility of the developed model, and the suitability of its structure and the performance measures using the 10 points Likert scale. Moreover, participants were asked to give their feedbacks on any additional comment on the model. Moreover, participants were asked to give their feedbacks on any additional comment on the model. The feedbacks were categorized and analysed to show the models' potential strong points as well as any suggestions aimed at improving the validity and effectiveness of the model.

3.6 Sampling strategy

There are two main sampling techniques; the random sampling and the non-random sampling technique.

Random sampling in which the items sampled are selected according to some known laws of chance such that every item in the population has a known chance of being selected (Saunders *et al.,* 2009). Examples are simple random sampling, cluster sampling, stratified random sampling and systematic sampling.

Non- random sampling involves sample methods that do not make use of chance in the selection of items (Udofia, 2011). Examples include quota sampling, purposive sampling, snowball, self-selection and convenience sampling.

This study adopted the purposive sampling technique for all qualitative methods and the convenience sampling technique for the quantitative method.

• ***Sampling strategy for the qualitative methods:***

The population considered for all the qualitative methods used (semi-structured interviews, case studies, focus group and experts opinion) required the participation of

experienced professional in facilities management and/or performance measurement field. Bruseberg and McDonagh (2002) said that the participants are required to have reasonable knowledge and understanding of the subject and must be willing to discuss it. Based on this, the requirement for this study falls under the 'Non-random sampling', particularly the 'Purposive Sampling'. According to Saunders *et al. (*2009) p**urposive** sampling technique enables the researcher to use judgement in selecting cases and participants that can best answer research question and meet the research objectives

After following the above sampling approach, a preliminary list of potential participants was prepared. To improve the response rate, all the potential respondents were previously contacted to explain the aim and objectives of the research and specifically the purpose of the data collection to be conducted, and to ask them if they are interested to participate. Based on this, the below table 37 presents the finalized list of participants in the three qualitative data collection methods: Initial Interviews, Focus Group and the Validation.

Table 37 List of participants in the qualitative data collection methods

Sl No.	Job Title	Organisation Type	Initial Interviews	Focus Group	Validation
1	Chief Executive Officer(CEO)	FM Service Provider	X		X
2	Board Member	MEFMA	X		X
3	GM	FM Service Provider	X	X	
4	Director	Government client	X		
5	Director	Real Estate Developer	X		
6	Operations Manager	FM Service Provider	X	X	
7	FM Managers	FM Service Provider	X		
8	FM Managers	FM Service Provider	X		
9	FM Consultant	FM Consultancy		X	
10	FM Director	Leading Property Developer Client		X	
11	Centre of Excellence Director	FM Service Provider		X	
12	Quality Manager	FM Service Provider		X	
13	Senior Director Quality and Outsourcing	FM Agent – Client Representative		X	
14	Lead Trainer	IFMA			X
15	Lead Trainer	IFMA			X
16	Accredited Assessor	EFQM			X
17	BSC Professional and Certified Trainer	BSC			X
18	Department Head	FM Consultancy			X

As shown in table 37, total number of participants is 18, none of the participants of focus group was part of validation task. However, two of the focus group participants and two of validation participants were interviewed during the initial stage; the discussions during the interviews did not propose new performance measures, the interviewees at the initial

stage gave their opinions only on the current status of facilities management in the UAE and the application of performance measurements within the industry. Based on this, no conflict within these data collection methods, the participants who validated the performance measures were not the same participants who proposed them.

• ***Sampling strategy for Survey study:***

The population considered for the survey is illustrative of facilities management professionals working in the UAE. As it is not possible to survey an entire population for practical and cost issues, therefore a sample of the population is more appropriate (Brewerton and Millward 2001). The requirement for this study falls under the 'non random sampling' under the sub-category of convenience sampling approach, as the respondents who gave their feedback in the research were the most accessible ones (Frankfort-Nachmias et al., 2000, Chinkeng and Abdul-Rahman, 2011). The collection of the respondent's contacts was done during the focus group workshop and from MEFMA data base of FM professionals of the UAE market.

The suitable sample size for a survey is generally a challenging decision. Recent studies have found that in most cases, a sample size of 150 observations should be sufficient to obtain an accurate solution in exploratory factor analysis, as long as item intercorrelations are reasonably strong (Guadagnoli and Velicer, 1988). For confirmatory factor analysis, we recommend a minimum sample size of 100 (Bollen, 1989). In this study, 335 questionnaires were distributed in total and 205 were returned this gives a total response rate of 61.19%.

3.7 Ethical Considerations

In this research, ethical issues were seriously given a priority to ensure integrity of the research. As a first step and according to Heriot-Watt University requirements, research ethics application form were filled and signed by the researcher and his supervisor and submitted to the post graduate committee for their approval to conduct the field work.

The assurances of absolute anonymity and confidentiality of information were included in the covering letters and/or the email invitations sent to the participants in all data collection methods used; the purpose of these letters were to clarify the aim of the study and to increase respondents' confidence with regards to confidentiality measures taken.

Moreover, to maintain the privacy of the respondents, their personal information were not included in any of the study findings, and the data collected were not used for any purpose other than as stated in the study to fulfil the PhD thesis objectives and requirements.

Furthermore, the information gathered being confidential to the organisations, the researcher didn't refer to any references within the case study description, neither in the bibliography. The names were given by the researcher without disclosing the real identity as requested by the FM companies.

3.8 Chapter summary

This chapter identified the methodology used to achieve the research objectives. And it was divided into two main parts. The literature and concepts of methodologies part which reviews the methodology research paradigms and methods as studied by social academic researchers and the second part related the actual research study process adopted.

In summary, this research study adopted the mixed methods approach within the pragmatist philosophical worldview, in which the researcher use both qualitative and quantitative information and techniques to achieve the best understanding of the research problem and construct a satisfactory knowledge. The study used both the qualitative and quantitative approaches. The qualitative approach by conducting a series of semi structured interviews and relevant case studies served to provide an insight on the performance measurement practices in the UAE FM organisations, then the opinions of a panel of experienced experts was gathered through a deductive approach using focus group method. Moreover, the quantitative approach was followed in which the professional feedbacks who have a high experience in FM industry were gathered by using a questionnaire survey this was followed by factor analysis methods.

Chapter 4 –PERFORMANCE MANAGEMENT PRACTICES IN THE UAE FM MARKET: CASE STUDIES AND INTERVIEWS

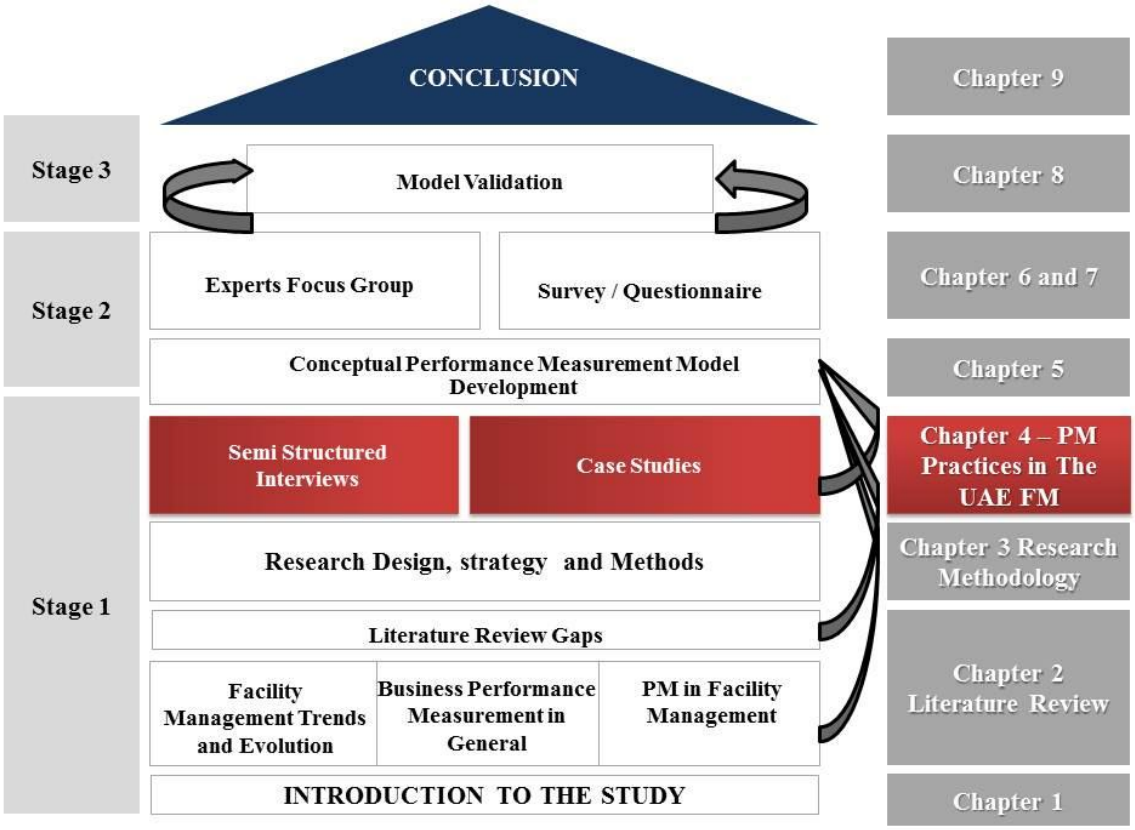


Figure 29 Research Structure - Chapter 4 PM Practices in the UAE FM Market

4.1 Overview

As there is a significant lack in studies and literature regarding the implementation of performance measurement and management systems in the FM organisations in the UAE, and in order to collect better understanding of this domain. It was decided to seek information about the current PM practices, the challenges and barriers and the expectations of the FM practitioners with regards to the optimum performance measurement model. To achieve this two data collection methods were used: the initial expert's interviews and case studies.

As indicated in figure 29, this chapter consists of two parts: the initial interviews and the case studies. Initial interviews were conducted simultaneously with literature review, and then the researcher conducted case studies within three service providers' organisations

exploring how the performance measurement models are used in the FM market in the UAE.

This chapter shows practical evidence on the status of performance management in the UAE facilities management industry and was a base along with the conducted literature review to show the need of developing a comprehensive model that measures the performance of FM organisations.

Part I- Semi structured interviews

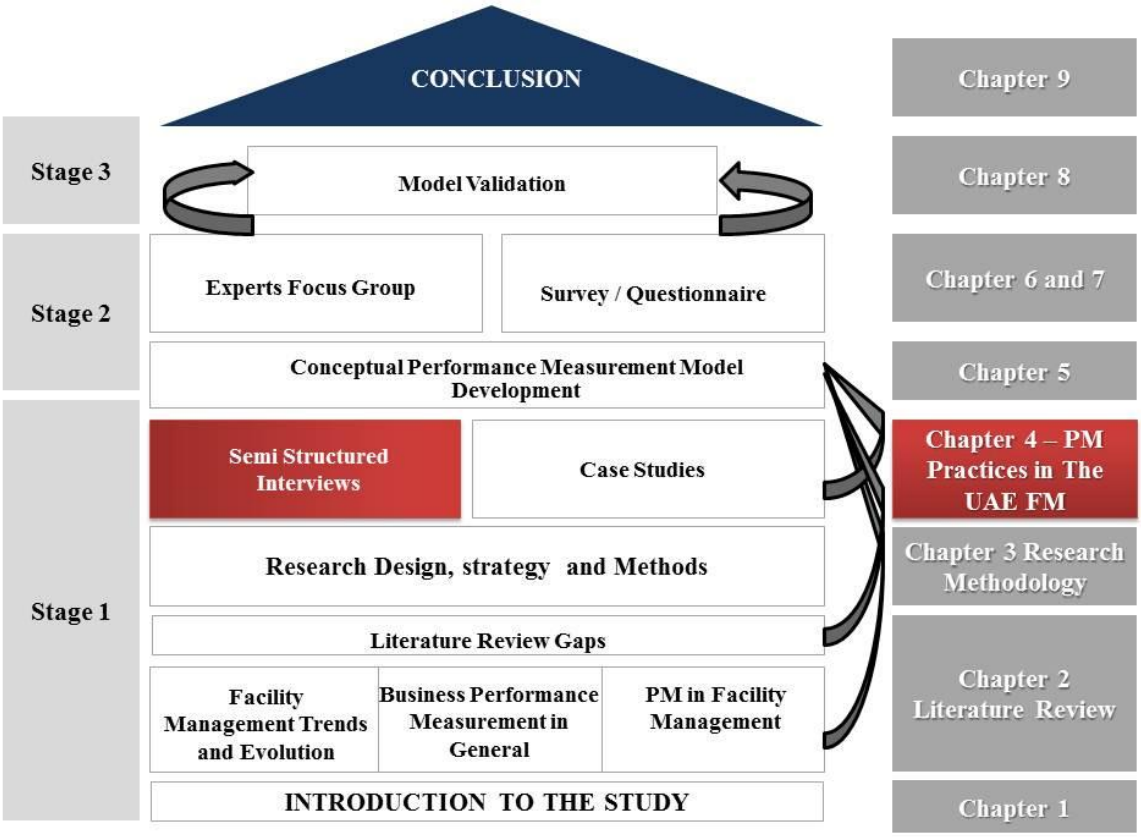


Figure 30 Research Structure- Chapter 4 Part I: Semi Structured Interviews

4.2 Current Practice of PMS Techniques in Facilities Management in the UAE

In general, a criticism has been made that researchers do not use the concepts of performance measurement in a rigorous manner and that the performance measurement models used are mainly general and not fulfilling the FM characteristics (Amaratunga and Baldry, 2001). In many articles, the FM performance measurement has been avoided mainly because FM organisations estimate the implementation of such initiatives is long, time consuming, complicated and counterproductive in an era where the priority goes to realizing profitability and flexibility to the client (Becker, 1990). Therefore, studies on the performance measurement in the FM setting were considered to date somehow superficial (Simoes et al., 2011).

Since there is a lack in studies with regards to the implementation of performance measurement and management systems in the UAE FM organisations, and in order to collect more information and a better understanding of the UAE FM context, the

researcher has conducted semi structured interviews with senior FM practitioners at a series of separate meetings. Interviewees were selected through the colleagues and researcher's peer in the field. Discussions were conducted following a set of 4 main questions which were not taken by order at the time of interviewing but following the natural flow of the interview.

4.3 Semi Structured Interviews Process

As mentioned in the previous chapter, semi structured interviews are very helpful in exploratory study because they can explore and explain existing contexts and open new insights that emerge from the interviews.

The process of conducting those semi structured interviews was explained in research methodology chapter section 3.5.2.1. Table 38 summarizes the main purpose, the interviewees' profile and the main questions covered during the interviews.

Table 38 The semi structured Interviews

Purpose	• Gaining an insight on the FM Opportunities and challenges in the UAE • Better Understanding of their practices with regards to performance measurement • Obtaining additional information from the empirical world / field that has not been discussed in the literature
Interviewees	8 Interviewees' profile : • CEO of a leading UAE FM Service Provider (with > 3000 employees) • 1 MEFMA Board Member • GM of FM service Provider (with > 1000 employees). • 2 FM Directors of large clients : 1 Government client and 1Real Estate Developers • 1 FM Operations Manager overseeing 5 projects • 2 FM Managers
Type of Questions	Open ended / Flexible
Main Questions covered during the interviews	• What are the main opportunities and challenges facing the FM industry in the UAE? Fill in the SWOT format • Do you have a Performance Management system in place? If yes, what are the main advantages and disadvantages? If not, why? • Challenges / Barriers in the implementation of a PMS • Do you think there is a need for a PM model specific for FM?
Data Collection Methods / recording system	Notes taken by the researcher to facilitate transcription of the data for analysis
Interview process	• A brief Introduction made by the researcher • Discussion oriented by the researcher • Summary of the main points discussed • The researcher asks if the interviewee would like to add more.

4.3.1 Interviews Findings

4.3.1.1 Challenges and SWOT Analysis of the UAE FM Market

The majorities of the Interviewees believed that the FM profession in the UAE is well recognized by the government and the private sectors. However, some clients are looking for cutting cost and reducing the FM scope of works rather than having total FM solutions, and for example they request only a reactive maintenance instead of full and proper package that includes predictive and preventive maintenance. They highlighted the

issue of some clients' awareness and knowledge about the strategic role of FM and about the importance of a total, integrated, predictive and preventive maintenance in order to maintain their assets and optimize assets' life cycle.

According to the interviewees, the majority of them agreed that strategic FM improves their service quality and help them in prioritizing their organisational needs. Nevertheless, some interviewees declared that their companies do not adhere to Strategic FM standards or guidelines when practicing FM due to barriers like the lack of strategic planning in organisation, organisation culture, high stakeholders' interest and involvement, complicated decision making process, resistance of senior managers.

Service providers try to focus on understanding their clients' requirements, tailoring solutions and integrating them to exceed set targets. The main challenge is not in getting the best technology and equipment but in employing the right manpower. Even when it is the responsibility of companies to ensure they deal with credible worker providers, since labour contracts determine the price, the only way for them to increase profit will be to decrease expenses. So they end up bringing in a low quality workforce to fill the headcount. Many service providers believe soft facilities management does not require skills for it to work. However, cleaners and security workers for instance also need to have essential personality traits and exhibit the right behaviour required of their employment. This is unhealthy practice that is impacting and threatening the performance and sometimes FM organisation's reputation**.**

As for the main challenges facing the FM industry, the interviewees raised many points that they believe that they characterize the current status of the UAE FM market. They raised the issue of the recognition of FM is strategic value in their client's eyes, the pace in which property and real estate projects are growing and that FM is incapable of finding talented, skilled and specialized labour when needed. Another issue they are facing is lack of local labour, they need to import and recruit expat employees which requires from the FM companies a huge investment in time, visa procedures, trainings and cultural awareness to the labour.

It is also outlined that technology is playing a major role in reinventing FM services. Several new technologies have embraced the FM services industry lately: "Smart security surveillance systems, intelligent energy-saving solutions, smart building management systems, and advanced robotics are some examples of modern technology that are

boosting the new level of services. These advanced communication systems have enabled optimizing information, up scaling the level of operations, and enhancing services delivery to end-users", said the Managing Director of a leading UAE FM service provider.

In addition to that, key challenges to the UAE FM organisations were identified such like an unorganized sector with limited FM provider-customer experience, a shortage of talent acquisition, a late FM intervention in the building post construction stage and an underutilization of the technology (CMMS) capacity.

MEFMA board member said that "One of the fundamental challenges of the FM business is the low awareness of the sector". And added although the FM has been evolving so quickly, yet there are big numbers of end-clients who are still not opened up to outsourced services or FM administrations. The lack of awareness shall be progressively diminished with the UAE government strict laws with regards the building maintenances as well as the real estate, property and facilities management services."

Many interviewees talked about the value for money "Another challenge for the FM industry is the cost versus value". Most FM organisations confront a tough task of workforce administration. Their low budget pushes them to recruit a higher number of less skilled staff to preserve their accounts and liabilities. This fact impacts their service credibility in some critical areas where sensitive services including security and janitorial administrations are fulfilled with less skilled staff. And another growing challenge for FM experts is also to keep updated with the evolving innovation in terms of building sustainability, information modelling systems (BIM) as well as the Integrated Workplace Management systems (administration software, etc..).

Furthermore, there was a consensus among the participants that the absence of PM systems specifically for FM is one of the main weaknesses in this industry, and there is no proper benchmarking with other industry or even with a best practice in the same FM field.

During the interviews, the participants were asked to give their opinion on the Strengths, Weaknesses, Opportunities and Threats. Table 39 below summarizes a SWOT analysis of the internal and external factors which exist in the UAE market.

Table 39 SWOT Analysis

Internal Factors		**External Factors**	
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- High growth rate - High domestic market potential - Reduced labour costs - Experienced business units - Presence of multinationals - MEFMA support and regulations	- Low awareness of the sector No performance measurement system specific for FM Low investment in research and department Lack of Benchmarking - Slow career development in the majority of service providers - Poor HR strategy - Planning practices	- New markets in the region - Growing economy - Real Estate Boom - New technologies developing new products and services	- Lack of recognition in some regions - Oil price decrease shrinks the government budgets - Shortage in skilled and high specialised labour force - High turnover of the employees -Absence of information standardization, - Increasing costs might be possible. (VAT inclusion) -Technological changes impacting the labour force - Lack of Job security

4.3.1.2 Implementation of a PMS

The interviewees had diverse opinions about the level of implementation of performance measurement in the FM industry, as well as the level of awareness, understanding and perceptions of performance measurement.

While some attributed the implementation of a performance measurement system to the external factors such as competitive pressures and customer needs, others related it to the organisation's intention to improve the quality of its services and effectiveness of their departments, and the remaining would implement it to monitor their employee's performance.

The CEO said "applying performance measurement in facilities management will benefit both client and the service provider, taking into consideration the participation of the related departments to form objectives and measures to improve the delivery of the service."

It is worth noting that the researcher looked to understand from the interviewees the trend of the market as per their knowledge. As per their interpretations, the methods widely used in the market are the financial account base and the main success criteria for organisation is measured by it its turnover and net profit.

One of the interviewees said that the PMs used are simple and not objective oriented and focus on management aspect and most of them have indicators and little emphasis on performance targets and monitoring process.

Indeed, only few have implemented the BSC due to its complexity as mentioned a Senior Director. "The balanced scorecard is as it is.... a scorecard and that is what makes it complicated…added to that there is no such guidelines about the KPIs to be used within each of its four perspectives." said the senior director.

The majority of them declared that they target the SKEA (Sheikh Khalifa Quality Award) or the DQA (Dubai Quality Award) for business excellence noting that those two awards are given based on an EFQM annual assessment of the organisation. Only one interviewee has witnessed the implementation of both the BSC and the EFQM together in his organisation. The CEO saluted the effort of the management and employees in committing and being involved in every step of the implementation to make it a success. However, he stated that the TQM approach consume a lot of resources.

4.3.1.3 Barriers in the PMS successful implementation

The interviewees discussed the barriers that encumber the implementation of the PMS in the UAE FM organisations, and the discussion was directed to three main areas: The lack of management involvement, the employee resistance and the complexity of the indicators and measures formulation.

In the UAE market, the small and medium sized FM service providers still fear the concept of having their departments exposed to control and monitoring, they believe that this will threaten their "comfort zone" and might impact their profitability, and will add their workload and they don't see the benefits comparing with the time and cost consumed thus they hinder the full implementation of a performance monitoring systems.

The GM of a leading FM service provider asserted that the performance measurement in their FM organisation appears to be used for short-term decision making as a reactive

approach; this reflected the lack of planning skills and shows the absence of long term strategic thinking within the FM organisations. Moreover, the high staff turnover that characterizes the industry delays the successful implementation as reallocation of roles, and new assignment of employees can hold the implementation agenda for months.

It was mentioned that the FM managers are searching for solutions that do not need a lot of time or effort. Their daily workloads and pressure prevent them from spending time thinking about relevant performance measures, so they are forced to fall back on simple and traditional solutions and resist the change. Moreover, the FM managers mentioned that there is a lack of communication between high management and employees; and the senior management needs to give extra support for the PM implementation to ensure its usefulness

Furthermore, it was highlighted that Performance Management in the FM industry is service-provider driven as most of them relied SLAs and KPIs for operation standards rather than of formulating their own. Although the management measurements were categorised accordingly, the measurements are generic, with little emphasis to performance monitoring methods. They should be structured, strategically designed and customer-driven where, in the formulation of the performance measures, the FM team should take into consideration the customer's feedback.

4.3.2 Interviews Findings Summary

As a summary, the initial semi structured interviews delivered a SWOT analysis for FM market in the UAE which shows that the absence of PM systems specifically for FM is one of the main weaknesses in this industry, and showed that the FM service providers professionals recognize the importance of the performance measurement systems but admit that their organisations do not fully implement them as they lack the dedicated resources as well in some cases the budget to put in place such systems. Moreover, the implementation of PMS as a strategic step forward is considered new and alien to the FM service sectors, as the industry is still immature. So, it is apparent that there is a strong need to identify performance measurement mechanism within FM.

Moreover, the interviews show that the current practices of PM in the UAE vary from one organisation to another, depending on the services provided or requested by the clients.

One of the key issues of the PMS used by many firms is that they have traditionally adopted uni-dimensional focus instead of a balanced set of measures.

The interviewees representing their organisations had also discussed the challenges in implementing the BSC in the UAE. It is easier for them to implement the EFQM as it has well established measures and it is encouraged by the government initiatives in excellence awards such as Dubai Quality Awards and Sheikh Khalifa Excellence Awards.

Difficulties in identifying the appropriate measures and evaluating the importance of each measure ,also a lack of strategic planning skills, Incompatibility of the existing models with FM requirements and priorities, unclear vision of how to connect the PMS with their objectives.

It was clearly emphasized that establishing the proper performance measures is the most important part of the PM system; this outcome supports the views stated in performance measurement in FM literature that it is a challenge for most of FM companies. Hence, from this view, it is assumed that this is the most difficult issue of performance measurement development process.

Based on this, there is a need for a comprehensive and balanced Performance Management model representing performance issues specifically for Facilities Management. The PM management tool should be holistic and vital to enable a proper planning, change management, required communication, efficient resource allocations, continuous improvements, and long term objectives focus and it should also help FM managers to understand their targets in order to achieve the best FM service delivery.

Part II- Case studies

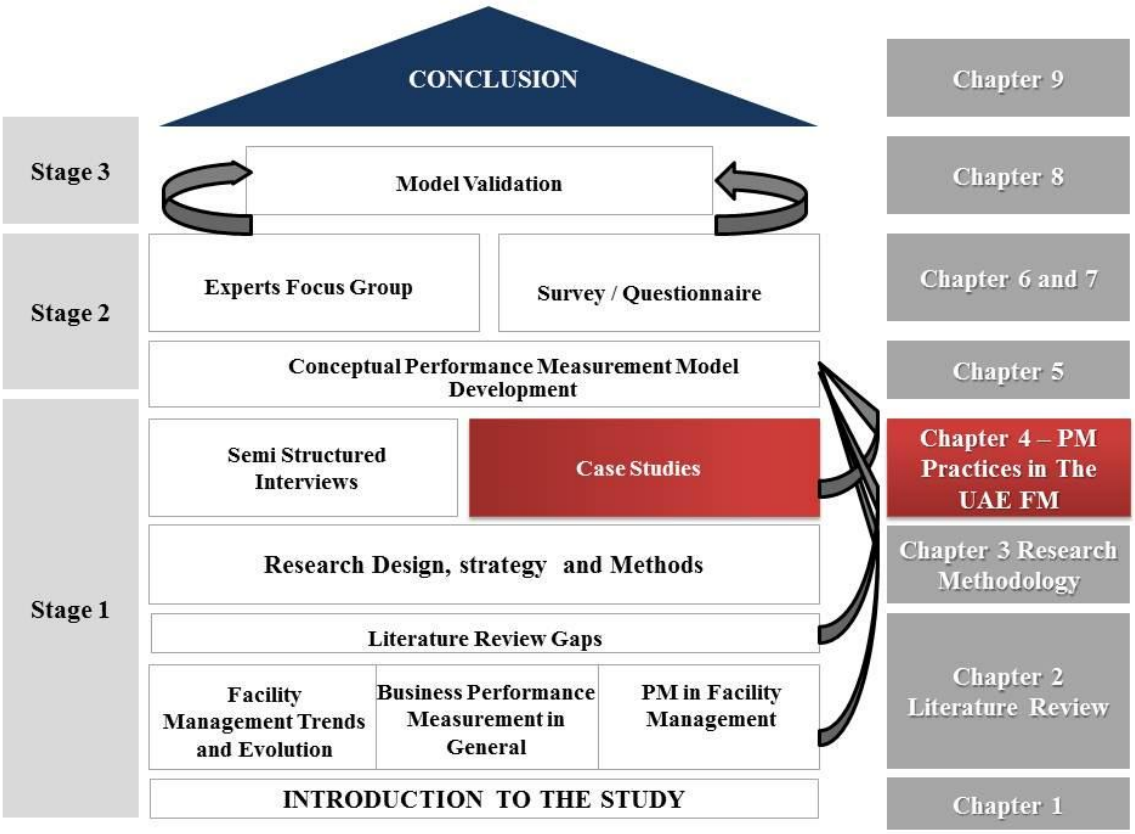


Figure 31 Research Structure Chapter 4 Part II: Case Studies

As indicated in figure 31, this part includes the case studies. It starts by introducing the background of the case studies of the service providers in the UAE, the facilities management services they offer, and the performance measurement systems implemented. Throughout the case study design and process, focus was given more to the performance measurement tools used, the challenges of its implementation within the organisation as well as potential gaps on performance criteria that the performance measurement systems in place do not embrace. To conduct the case studies, the opportunity of conducting interviews with senior management was used. In total, three case studies were compiled and a summary of the outcomes of all case studies is presented.

4.4 Background of case studies

4.4.1 Objectives

The case studies aimed to explore through a qualitative method how the performance measurement frameworks are implemented and practiced within the UAE FM organisations.

The focal objectives of conducting those case studies can be summarized as follows:

1. To explore the performance management models used in the UAE FM organisations,
2. To explore the main challenges faced during the implementation;
3. To identify the weaknesses of the BSC or EFQM when used separately,
4. To study the main elements of performance measurement crucial to the assessment of the FM organisation that the EFQM and/or BSC eventually are deficient in.

4.4.2 Data Collection and analytical procedures

As noted earlier in the research methodology chapter section 3.5.2.2, three FM organisations were asked to study their application of the performance management systems. The case studies data were collected using semi-structured interviews, review of documents and quality assessor feedbacks.

The three case studies were compiled to provide a summary of the outcomes and to illustrate the differences perceived on the companies' performance management models and frameworks adopted and to summarize the main findings which would illuminate the research into additional performance factors or criteria to be taken into consideration.

The information gathered and collected being confidential to the organisations, the researcher doesn't refer to any references within the case study description, neither in the bibliography. The names are given by the researcher without disclosing the real identity as requested by the FM companies.

The case study process started with a first communication settled with the CEO or the GM via a phone call and then a letter as per the interview protocol. This first communication was crucial to ensure a proper involvement from the company's representatives. Having the strategic and executive level supported allowed a smooth and easy communication as well as most importantly reliable and trusty information.

All interviews were conducted in Arabic or English, the official business languages in the UAE. Also, in each interview it was highlighted that all responses of participants would remain anonymous.

4.5 Case Study 1- BHF FM (BHF is not the real name)

BHF FM is a local company established in 2008 as a subsidiary of a large real estate developer. BHF FM was considered, until 2014, as an exemplar of relatively poor practice in performance measurement. In 2014, a new management has been assigned to restructure the company and to improve the service level. The new management launched the project of the Balanced Scorecard implementation as a performance measurement system.

This case study details at first place the findings of a review undertaken on the operational delivery of facilities management services at BHF before the BSC being implemented. A programme of research activities, such as document reviews, interviews and workshops was carried out.

Initial discussions with the General Manager, the Operations Director, the Facilities Managers and the consultant took place to collect data with regards to the organisational structure, the operations, and the organisation change that occurs in 2015 as well as the performance measurement system in place or to be used. The primary focus of the review was to gain an in depth knowledge into the day-to-day workings of the current FM operations and to identify the gaps. The operations and processes would then be assessed against international standards and recognized best practices.

4.5.1 BHF Company profile

BHF is the facilities management arm of a local holding and real estate developer in the Emirate of Abu Dhabi. Based in Abu Dhabi, BHF FM provides its services to major cities in UAE. Established in 2008, BHF was meant to provide facilities management services within the holding in order to maintain the mother company assets and facilities.

BHF specifications end 2014

400 Staff

7 years' experience

Client Portfolio: Residential, Retail, Educational, Mixed use, Sports facilities

Absence of Performance Measurement Systems till 2015 when BHF start implementing BSC

Absence of Documentations, SOPs, Method Statements, etc...

Absence of standards followed in carrying out the maintenance (No PPM, only reactive maintenance was carried out)

Very limited exposure to the local market

However, in 2014 the mother company conducted a huge management change in the FM service provider in order to raise the bar and to improve the competitiveness of the services provided as well the performance of its operations and to open to external opportunities in the local market and generate external revenues streams.

The new GM appointed in early 2015 decided to transform BHF into a centre of excellence. Therefore, a detailed workshop in parallel with the operational review subject to this study was conducted in order to assess the maturity level of the organisation at that time and how to improve the quality of the service levels.

4.5.2 Services provided by BHF

BHF provides a wide range of FM services starting from hard services to soft services and FM consultancy services as described below:

Table 40 Facilities Management Operations

Mechanical Electrical Plumbing HVAC Civil Refurbishment Security and CCTV Monitoring Waste Management	Receptionist and Administration Cleaning and Housekeeping Landscaping and Internal Plants Porter / Mail Delivery Office Assistance / Serving Refreshments Specialist Sub Contractor Management Pest Control Help Desk

Table 41 Facilities Management Consultancy

Service Charge Development Lifecycle and FM operational budgets Cost models, FM operational design reviews Procurement of FM services Health, safety and environmental management guidance	Transition Management (including technical support on handover, commissioning of buildings and assets, etc...) Development of FM operational delivery strategies

Some of the FM services described above were retained in-house like MEP and Cleaning due to the constant demand for those services and to the company's capabilities. Other services such as specialized services (e.g. firefighting, fire alarm, gas system, etc.,) are contracted out due to their specialist nature.

4.5.3 Initial Observations

It was apparent that the BHF Company, as it states at end of 2014, lacked the well-defined vision, strategy, clear goals and objectives. Moreover, many activities were taking place through verbal instructions with weak or not organized flow of information.

The company intended to implement a new business performance management system to improve the overall performance level and the quality of service delivered. The consultant appointed recommended the balanced scorecard as performance measurement framework.

In the beginning of the workshop, the consultant affirmed that the balanced scorecard can be used as a strategic business performance measurement framework, it translates the organisation vision into objectives in four main perspectives: financial, customer, internal business process and learning and growth. However, to make this framework useful for the organisation, the FM procedures and features should be taken into consideration when defining the performance measures within these four perspectives.

In developing a growing organisation, it is essential that the ingredients of strategic direction, tactical deployment and service control are balanced. Lack of direction leaves the organisation lost and wondering which direction to take, lack of tactical deployment leaves gaps in the service delivery and the organisations objectives are not met, not enough control and the deployment fails and the organisations objectives not met.

Before launching the balanced scorecard, the consultant addressed an action plan to the organisation. Achieving the action plan tasks was necessary in order to set any performance measurement easily and effectively. The consultant said that to get the best outcomes from using the balanced scorecard, the organisation must have a good organisation structure and well defined internal processes in line with the best practices FM processes. Appendix B shows the action plan that required 6 months project.

4.5.4 Balanced scorecard on the track

The new management faced the issue of not having effective records of how performance was being achieved years ago. Therefore, they planned balanced scorecard sheets to start evaluating the overall performance of the company focusing on 4 main aspects: financial, programme internal process, customer satisfaction, and learning and development.

They conducted many workshops to identify the key performance indicators to be used and to be measured against a baseline. The company undertook the Balanced scorecard project through 4 stages as shown in the figure 32 (see Appendix B for Details):

- Stage 1- Strategize
- Stage 2- Plan
- Stage 3- Integrate
- Stage 4- Implement

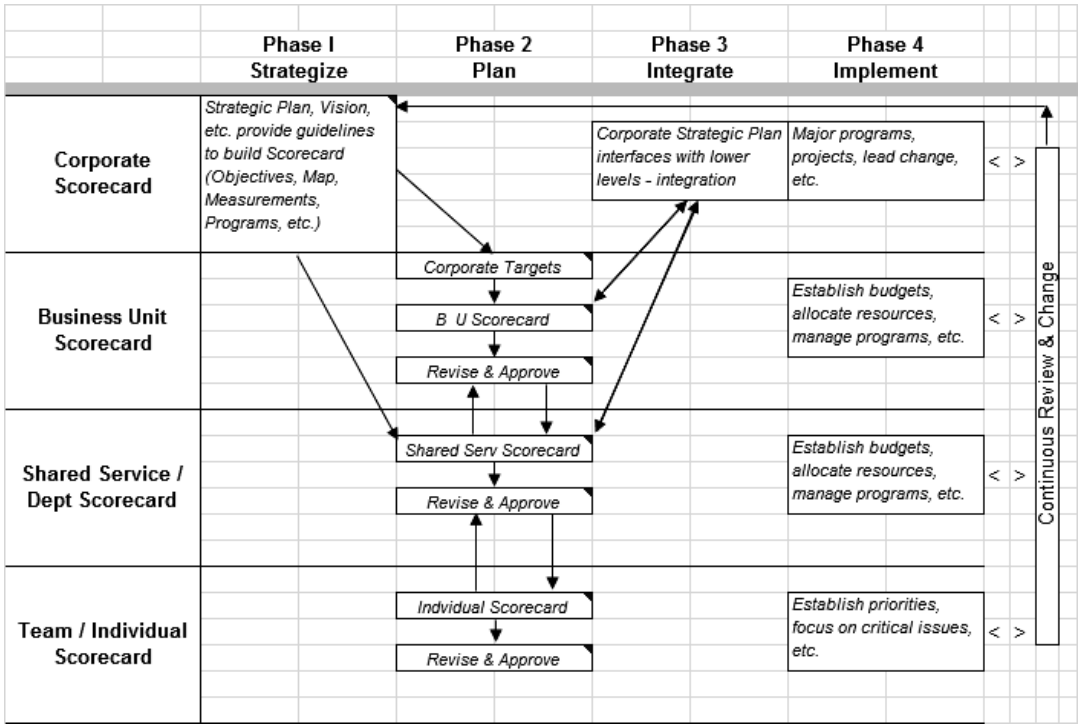


Figure 32 BSC Implementation Stages

4.5.5 Key observations and criticisms

BHF allocated significant resources to introduce new systems that address this issue directly. BHF had earlier little focus on management processes, and poor service performance. The organisation lacked planned procedures. Facilities Managers tend to do whatever activity was required to get the job done, with no regard for the effects on other projects. At that time, the company was under a situation that required major improvements; time, cost, quality and customer satisfaction suffered.

With the new management on board, BHF established policies and procedures for managing and delivering business and customer requirements. Within 6 months, the organisation put in place 42 procedures related to different departments (HR, Finance, Procurement, QHSE, Operations and Business Development). The target is to have 70 procedures within a year.

As per the interviews conducted with the high management members, human resources director, Chief Operations Officer, it was concluded the following:

1- It was concluded from the interviews conducted, that BSC was used by senior management located in the headquarter to help in creating vision, mission, strategy clarity and strategy implementation and monitoring, BSC translated their vision and mission into clear and measurable outcomes that define success, and were shared within the organisation and implanted in headquarter and shared departments
2- It was appreciated that the BSC gave a considerable focus on non-financial perspectives.
3- However the BSC does not show the interest of all stakeholders and it is considered as a controlling and not an improvement tool ,
4- Absence of a BSC Project Leader. The absence of an in-house Quality Manager in launching and leading this project created a threat to the successful implementation of the BSC. Each head of department has defined the department KPIs, but there is clear absence of the key person who supposed to coordinate and lead the whole process.
5- Corporate Social Responsibility is not clearly defined in BHF PMS. CSR is nowadays a social result and differentiation strategy adopted by many companies

to acquire and retain their customers. CSR improves normally the customer satisfaction and their company brand image.

6- In addition BSC doesn't have predefined measures which can be considered when measuring the performance, so each company will create their own measures depending on what they consider will achieve their success. Based on this, BSC cannot be used as a benchmarking tool, and the companies cannot benchmark their performance against other companies, because each company will have their own goal.

7- External Awards or benchmarking with the external environment is of a great importance for the company to position itself. Many interviewees declared their demotivation to implement performance system if it is not linked to the external environment and allows them a certain level of benchmark with their competitors.

4.6 Case study 2- SOS FM (SOS is not the real name)

SOS FM is a large sized multinational but locally owned with local management. It has witnessed a vast growth during the last decade.

SOS FM specifications end 2016

- 4500 Staff;
- More than 10 years' experience
- **Client Portfolio:** Government, Commercial, Residential, Retail, hospitality, Mixed Use, Educational, etc...
- Implementation of EFQM in 2011

The business measurement orientation of the company has been predominantly financial, but has recently changed to a more balanced view of financial and non-financial measurement.

The largest clients of SOS are from public sector and they had pushed the company to have an EFQM orientation. This has helped them in identifying the benefits of balanced performance measurement. SOS launched a project of EFQM implementation in 2011 despite some resistance within the high management level who had some concerns on the investment in time, efforts and costs in a critical period of delivering some big projects in the market.

4.6.1 The EFQM Feedback Report

EFQM implementation:

The feedback report has been produced following an assessment of SOS FM referenced against the EFQM Excellence Model and using the RADAR scoring methodology.

The process included the following key steps:

- Individual assessments of the submission document by assessors
- An initial team meeting for liaison with SOS FM and site visit planning.
- Consolidation of individual assessments and identification of site visit subject areas. This comprised a number of interviews with SOS FM staff. In addition the assessor team considered a considerable degree of supporting documentation in both hard copy and electronic formats.
- A final consensus meeting followed by completion of this feedback report.

Members of the team have "owned" criteria and concentrated on those areas during the assessment and production of the feedback. Every effort has been made to ensure that the feedback is based on fact and that inputs have been interpreted correctly.

4.6.1.1 EFQM Report Executive Summary

SOS FM has a very successful track record of innovation, growth and profitability over recent years. The future presents a new set of challenges with a restructuring and further progress towards becoming an energy saving solutions provider and systems integrator. There is a sound base on which to build, with an enthusiastic and motivated workforce, strong brand positions and long term customer loyalty. Despite this, the challenges of the competitive marketplace will remain and grow. The clear vision and strong leadership will help to drive the organisation forward.

The major EFQM team comments are detailed in the below:

- **Sustaining Outstanding Results**

  - There is a strong results orientation within SOS FM with a clear strategy for growth and achievement.

- There is clear evidence of appropriate indicators of performance having been established for all areas of activity.
- Key financial and non-financial performance has been generally positive over the last three years. There is a significant range of audit and review information available and the continual review of the overall strategic planning process in line with market changes and acquisitions enables the company to review the relevance of key measures.
- Trend data is available for Customer Results (over 5 years) with clear analysis of performance. The Employee results profile reinforced the sense of SOS being "a good place to work", both from survey feedback and motivation and turnover figures.

  However, the comparative benchmark data used comes to a large extent from within the SOS group which may limit the drive for competitive advantage and best in class performance.

➢ **Adding Value for Customers**

- The organisation has strong and clear customer focus. Comprehensive segmentation of customers indicates that organisation understands the wide range of customer needs. They also understand key drivers that will bring added value to the customer and enhance the organisation's market position.
- The transition from service provider to an integrated FM solutions provider will further enhance the competitive position in the UAE market place and provide opportunities to grow in new areas of business. The existing portfolio of hard and soft services is continuously analysed and improved, often in close cooperation with the specialised subcontractors and suppliers and mutual understanding with the customers. Fairness and transparency of information towards customers is one of the enablers for this to be achieved.
- Customer satisfaction and organisational performance regarding customer results are managed through the comprehensive set of segmented indicators. More challenging benchmarking could accelerate the organisation on the excellence path.
- SOS FM nurture and promotes a culture of a customer oriented organisation in which people are encouraged and trained to add value to the customer.

Leading with Vision, Inspiration and Integrity

- The corporate strategy and business model evolution seem to be well understood and shared by stakeholders at all levels. The "Think as a Customer!" philosophy is fully embedded in the company and used not only for the customer interactions but also used internally in the organisation. Continuous improvement is fully encouraged and supported by the leaders and visible everywhere in the organisation.
- This has also led to a good integration of the different companies in consequence of the various strategic partnerships and alliances that were carried out in the last two years, generating a strong corporate identity that plays an important role in daily activities.
- The leaders fully understand their customer present and future needs in sustainability and green energy as depicted by the UAE government and implement the required changes to the services portfolio and the organisational structure to eventually become an integrated FM with green initiatives. Therefore, driven by the code of conduct, the leaders maintain a strong involvement with internal and external stakeholders.
- Further investment in development of leaders would be beneficial as the desired leadership competencies are not present at all levels and are not part of the current manager appraisal system. Innovation could be further embedded in managing the processes and people.
- Overall the employees have demonstrated a high degree of trust into the ability of the leadership in taking SOS into a prosperous future.

➢ **Managing with Agility**

- SOS FM has developed a clear process managed approach to business operations based on three core processes: Project Processes, Support Services and Technical support, which are well supported by set of software tools and supporting processes.
- All processes are defined, implemented and documented, process owners are in place with clearly defined roles and responsibilities and performance measures linked to the strategic goals.
- The organisation has developed culture of continuous improvements of the processes which is implemented through several international standards –ISO standards 9001, 14001 and OHSAS 18001. The QHSE Department (Quality Health and Safety

Department) was identified as a key contributor of driving and spreading the culture of continuous improvement.

- Improving data integrity and reliability through the harmonisation of data definitions for SOS FM and SOS Group is a major improvement opportunity

➢ **Succeeding through the Talent of People**

- People are considered a key success factor for achieving future strategic goals. There are a number of initiatives in place and under development to improve the skills and competence of staff in the company. There is a clear commitment to training and development demonstrated by the strong and structured approach to training provided by SOS Academy. However, some of the initiatives, such as the competence model, are in the early stages of development and there is limited integration of the competence model into recruitment and performance review.
- Although some improvements have been implemented there are further opportunities for the recruitment process to be more efficient and effective in meeting the changing needs and specific skills for new and rapidly growing business sectors.
- A comprehensive programme for Leadership Development has been implemented but there are opportunities to improve the selection process in order to avoid raising expectations amongst potential applicants. At present, this does not appear to be linked to succession planning which itself is rather limited in its current form.
- The internal communication process appears to work well and is structured into a number of different and comprehensive channels. However, there are opportunities to improve the timely delivery of information and effectiveness of bottom-up communication.
- The results of the employee survey show improving trends over recent years although there are some significant variations across business units and at present there are no challenging external benchmarks for comparison.
- There is clear evidence that most staff regards SOS FM as a good company to work for and generally feel valued, supported and empowered. This is reinforced by very positive feedback from apprentices and the apprentice council although apprentice survey results do not present quite such a positive picture.

➢ **Harnessing Creativity and Innovation**

- It is clear that SOS is committed to continuous improvement and improving the organisation and people. There is evidence of involvement in SOS Group forums and networks to facilitate sharing of expertise and good practice.
- The "Think as a Customer!" philosophy embodies the company approach to continuous improvement. The focus on the customer, the sustainability of the organisation and learning from feedback are drivers for changing processes and indeed, the organisation.
- The company is committed to internal and external assessment using the EFQM Model. However, there is less evidence of seeking and learning from external best practices.
- For large change projects the synergy of different service departments (training, QHSE and CSR) is used to help move the organisation in the desired direction. Considerable attention is also paid to the changing of the culture in the organisation through such initiatives as the Leadership development programme.
- Although the strong drive for improvement exists across the company there was less evidence of a structure to encourage and support the generation of innovation and ideas beyond the ideas management database, which does not appear widely used at present.
- The sustained levels of performance (financial, operational, market share and customer satisfaction), shows that encouragement of changes leads to improved performance.

➢ **Developing Organisational Capability**

- SOS FM has obviously recognised the need to work with strategically important partners in order to implement their strategy. Much has been done to develop close partnerships within the supply chain and also in the customer area. SOS FM has embedded a strong process for selection and evaluation of partners and the company enjoys a high degree of freedom to select and develop future partners in order to meet the UAE market demands.
- SOS FM enjoys good working relationships with its partners and suppliers which have been developed through a collaborative approach to training, learning and sharing, and joint improvement activities.

- SOS FM is very dependent on the performance of the main soft service delivery partner, SOS SFM, and at present they have very limited influence on the quality and speed of customer delivery. This could be critical in an increasingly competitive market place.
- There is now an urgent need for SOS FM to identify and develop new strategic partners who have the necessary skills and expertise to support the business strategy and new market opportunities. This is another critical factor for the success of a solutions focused business.
- There was little evidence of any partnership development with community, social or environmental organisations in support of the CSR strategy.

➢ **Creating a Sustainable Future**

- Corporate Social Responsibility and sustainability is a fundamental element of the SOS philosophy. It informs not only the development of the product portfolio but also the way in which the company meets its corporate responsibilities to employees and wider society.
- In terms of products, there is a strategic view on life cycle performance, incorporating energy consumption, refurbishment of products, retrieval and recycling of consumables. ISO 14001 provides a structured approach to managing environmental related activities across the company
- Environmental considerations are part of the supplier selection process. A number of awards and accreditations have been received for CSR initiatives and programmes.
- CSR Index has been developed by SOS FM to help coordinate the management and measurement of CSR activity. This Index is fully aligned with the Code of Conduct priorities.
- One notable element of the CSR Index is the CSR survey which represents a structured attempt to measure stakeholder perception of initiatives. However, measurement of the effectiveness of related activities and initiatives was less evident.
- There are a considerable number of initiatives at company level and also a number of local activities within departments. This contributes to an overall sense of meaningful contribution to local society.

4.6.2 SOS FM PM Review and the interviews conducted

As a summary the below points can be highlighted from the EFQM implementation:
There is a strong results orientation within SOS FM with a clear strategy for growth and achievement.

There is clear evidence of appropriate indicators of performance having been established for all areas of activity.

Key financial and non-financial performance has been generally positive over time.

There is a significant range of audit and review information available and the continual review of the overall strategic planning process in line with market changes and acquisitions enables the company to review the relevance of key measures.

Trend data are available for Customer Results with clear analysis of performance. The Employee results profile reinforced the sense of SOS being "a good place to work", both from survey feedback and motivation and turnover figures.

In general terms much of the comparative benchmark data used comes from within the SOS group which may limit the drive for competitive advantage and best in class performance.

SOS FM has a very successful track record of innovation, growth and profitability over recent years.

The future presents a new set of challenges with a restructuring and further progress towards becoming energy saving solutions provider and systems integrator.

There is a sound base on which to build, with an enthusiastic and motivated workforce, strong brand positions and long term customer loyalty.

In their performance measurement system, SOS FM has defined metrics, and indicators but ignored attributes and parameters which can be linked to performance factors. A manager stated that SOS calculates the employee turnover ratio and monitored it, but this indicator misleads SOS Management. According to him "the labours work without developing loyalty, they consider their stay in organisation until they find better situation with better salary… unfortunately, the company cannot trace it until the employee resigns. Which is too late for a reputable organisation… we are losing our talented employees…"

Adding value to customers, improving internal customers and valuing a learning and development culture within SOS FM are certainly enabling the company to achieve their financial targets and improve their performance.

The purpose of measurement, being to identify strengths and weaknesses, areas for improvement in order to assess the implications for learning and knowledge management, allowed the managers to introduce new processes to link the strategic and long term objectives with the short terms ones. Creating a sustainable future was cascading down into actions and initiatives, measurable and reviewed actions.

Indeed, SOS is estimated at maturity stage as it involved innovation and incorporated this continuous improvement system as integral part of the organisation's culture.

Although SOS FM has made substantial improvement in their business processes, it still needs to make more initiatives on the leadership development, employee personnel development and on the link between measuring performance and knowledge management.

Company representatives highlighted the issue of slow decision making process that is still prevailing in the company and which might hold back the company's investment in technologies and advanced mobile data solution. "Acclimatizing the company's process, employees and systems to the rapid pace evolving technologies is a survival need" commented the Head of IT Department. The company has recently made some losses in investing in mobile data devices and being unable to implement those handheld devices as quickly as should be. By the time, the company was ready, those devices were estimated outdated.

The alignment of performance measurement with knowledge management on one level, with the company's strategy and vision on a second level and with technology advancement on a third level is crucial in today business and in the performance measurement success.

Challenges:

The company was concerned on how customers were separated from other stakeholders in the system. The operations manager pointed out that implementing EFQM has consumed a lot of efforts and time. On the other hand, the framework was considered

comprehensive. "EFQM is strictly rigid and the balanced scorecard is more flexible", said the quality Manager. Providing an operational definition for the performance factors and linking the measurements to strategy would allow the organisation to secure better performance and a continuous improvement through a regular follow up and a follow up on the performance results linked to the policy and procedures taken.

Financial measures showed the effects of decisions already taken but failed to provide adequate guidance for long-term strategic development, also whether both management and operation are implementing actions correctly.

Some areas should be added to the measuring criteria which are related to the FM, for example mobilization and readiness. This has been highlighted by a SOS Operations Manager. The Mobilisation Managers faces a lot of issues while mobilising a new project. Huge disparities exist between bidding stage and project realisation. So mobilization should be considered one of the success factors.

4.7 Case study 3- IDA FM (IDA is not the real name)

IDA FM is one of the largest leading facilities management companies in the UAE and has witnessed a very rapid growth from 2007 to date.

IDM specifications end 2016

6100 Staff; growth rate of 7%

15 years' experience

Client Portfolio: Government, Commercial, Residential, Retail, Educational, Mixed use, Sports Facilities, etc.

Dubai Quality Awards (EFQM Based)

Implementation of BSC

Table 42 FM Scope of works

Hard FM Since 2001	Building Services, Specialist System, Asset Management, General Maintenance, Building Fabrics and Asset, Energy Management
Soft FM Since 2007	Waste Management, Pest Control, Grounds Maintenance/ Landscaping, Internal Planting and Decorations, Cleaning, Security, Space Planning, Parking Management, Traffic Control, Management Information, Helpdesk, Housekeeping, Portering services

4.7.1 Position of performance measurement in IDA

"*Excellence is visionary and inspirational leadership, coupled with alignment of purpose*", said the CEO in an interview. In 2010, the CEO introduced a 5 year strategic plan with the following key objectives: To build a brand that is recognized as market leader, increase market shares and revenue and increase profit. However, there was no indication of how their strategy is reviewed and refined.

Since then, IDA FM has become considered as a leader in implementing business performance measurement. The first attempts of business performance measurement were in the form of a set of KPI's created to measure its performance. The company then came across the EFQM model to submit for the Dubai Quality Award (DQA).

The quality team feedback is shared in table 43 below: IDA was requested to improve some criteria specifically: Leadership, their customer orientation, their employee development programs, and their health and safety systems. IDA launched a continuous improvement system based on four main pillars which are Performance Monitoring system, Quality Assurance (Heath and Safety culture), Personnel Development and Growth and Service Coordination.

Table 43 The quality team Feedback

Criterion	Actions needed as per the EFQM Assessment	Action Plan Taken as per the EFQM assessment
1- Leadership	1- Their leaders shall measure the effectiveness of their approach in developing vision, mission and values. 2- IDA leaders have to understand and develop the underlying capabilities of the organisation. 3- Leaders shall have a systematic and integrated approach to promote equal opportunity and diversity 4- Leaders shall be flexible: review, adapt and realign the direction of the organisation when necessary, inspiring trust at all times. 5- IDA shall apply an integrated approach to maintain sustainable advantage by learning and adopting new ways of working.	Evidence available: Management Review Meetings, Departmental staff meetings and Leadership training programs. Various awards and recognition. Further, the feedback obtained for the questions in the Leadership section of the annual Employee survey give direct evidence of management participation in Organisational Development Performance Planning has been in place. And has been deployed in 2013 from CEO up to Supervisor levels The 5-year strategy plan (2013 to 2017) was developed in Q4 – 2012 to leverage / extend the organisational capabilities and address the areas of improvement with market requirements / competition context.
2- Strategy	CAPEX are evaluated only on the basis of financial techniques, consideration of external factors such as economical, market, political, legal and regulatory compliance is not evident. Lack of evidence of understanding and anticipating the long and short term impact of changes to relevant political, legal, regulatory and compliance requirements. No evidence of clear strategy on mission like providing cost effective	Revised CAPEX evaluation process for all expenses > AED 0.5 M Investor Audit reports, Management review meetings, Quarterly BP review Supplier Selection process in Procurement and engagement "periodic evaluation", IT, HR, Operations, EHSQ, annual vendor evaluation, etc... Internal Benchmark establishment incorporated as KPI in BSC for 2013 Sustainability and CSR goals in BSC
3- People	A formal succession planning does not exist. Though the company has implemented an Employee Satisfaction Survey, no examples were given that support people involvement in strategy review. No formal targets are established for Emiratization, despite that Emiratis are given preference during the recruitment process. Though performance appraisal, open door policy and training effectiveness evaluation was not carried out before 2010. No evidence of an integrated approach of how they encourage their people to be more involved in the creation of the organisation's ongoing success. No evidence of a structured approach to ensure handling and embracing the diversity of their people.	Succession Planning defined from 2013 upwards Cultural mix of employees is a direct result of equal opportunity and diversity. Interviews are being conducted in different countries to maintain the diversity as much as possible. Organisation charts and HR statistics are also evidences SWOT Analysis with manager and above level taken to review strategy and identify actionable improvement items System in place by way of Org. Charts, SRFs, People Manual, Capability Development and Performance Management System
4-Partnership and Resources	No evidence of how the company is keeping a sustainable relationship with all partners. No evidence of an integrated approach of working together with partners to achieve mutual benefit, supporting one another with expertise; resources and knowledge to achieve shared goals like to reduce inventories.	MOU signed with strategic partners, suppliers and subcontractors.
5-Processes	No structured approach of how IDA uses data and information on the current performance and capabilities of processes to identify opportunities for, and generate, innovation.	Business Process Manual Management Review

The company decided henceforth to use the principles of the Balanced Scorecard in mapping the company KPIs to ensure a balanced and comprehensive view of the business. IDA has not though conducted both approaches in their entirety: the mapping to BSC was to match EFQM recommendation and was not cascaded down from the company's strategy. The BSC KPIs were used as part of the internal environmental scanning in the annual development/modification of strategic plans.

Nevertheless, the BSC implementation has allowed IDA a better performance monitoring and a regular periodic follow up. IDA issues five-year business plans that are reviewed every year. The levels of work and required resources are planned accordingly. The strategic objectives are measured every year to see if the results have been achieved, in addition to bimonthly financial measures.

As said above, the management set a number of strategies for the organisation based on 4 main pillars:

Ensuring Best Value (Customer focus)

1. To provide the highest quality facilities management services in the UAE FM market;
2. To develop a best in class services aligned with international standards;
3. To develop partnership agreements with international service providers to share knowledge and improve service quality as per the best practices of the FM industry;

Operational services (Internal Process and Financial):

4. To be recognized as a distinguished FM consultancy provider;
5. To ensure that the FM standards are implemented and continuously monitored and show noticeable improvements in the service delivery;

Quality Assurance and Minimizing Risks (Internal process):

6. The quality of FM services provided will be supported by a safe, secure and appropriate environment;
7. A commitment to comply with environmental requirements;

Training and Development (Growth and Development):

8. To ensure the services are of the highest standard by recruiting, retaining and investing in the most precious resource - the staff.

9. To create an environment where inquiry and review of practice continuously improved and where adjustments to practice and service development are promoted;
At this level, the company has implemented effective processes that can be practiced, enforced, trained, documented, evaluated and able to improve (table 44).

Table 44 Strategically aligned process improvement opportunities

Areas Identified for improvement	Critical success factors addressed	Suggested actions
Service Performance Monitoring	Quality	Develop an integrated facilities questionnaire for distribution to customers
	Reporting Timeframes	Appoint dedicated resources to undertake monitoring activity and monthly reporting
Growth and Development	HR Performance Appraisal (SMART Objectives)	Establish an appraisal form with a quarterly review process
Service Coordination	Service partnerships	Develop service performance agreements with strategic partners and define the Service level agreements as well as the KPIs
Health and Safety Management	Staff development and training	Develop a training schedule from HSE induction to regular H&S trainings and site inspections

4.7.2 A snapshot on IDA Best Practices and interviews outcomes

The Head of Quality Department was proudly discussing their successful achievement in retaining their customer and achieving 94% of their contracts renewal in a constantly changing, competitive and very challenging market. They had implemented in 2014 successful strategic approaches which include determining the need of the customer, enhancing service standards, improving the quality of the 24X7 Call Centre, enhancing personal interaction at Call Centre and Service Centres, the upgrade of the technology platform. "The face to face meeting with our clients was one of our greatest successes", estimated the QHSE Manager… *"Our customers were delighted to see someone coming*

from the high management, meeting with them, discussing about their concerns and promising them few corrective actions with a report share directly with the CEO..."

Another improvement action was the "Leadership Development Program / Succession Planning Program" within the organisation. This program aims at identifying the high performers or the high potential employees and to develop their expertise or technical skills. Hence the employees in the talent pool have the opportunity to move vertically or across different functions in the business and take key roles. The HR director revealed that they are preparing two other personnel development programs which are the advanced leadership program and Gender parity program. He trusts that these programs will highly impact their employee performance and allow them to retain their talented staff. However, he is worried about the way to incorporate that program within the PMS and how to monitor those actions.

It was concluded from the interviews conducted with IDA management that EFQM is a systematic model and it can be used as a self-assessment, while considering the continuous improvement where enablers improve from the feedback of the results. Moreover, it is a quality oriented tool that recognizes the strengths and weaknesses of the organisation. In addition, it can give internal and external benchmark, against company historical performance, sister companies, other branches and even external against other competitors, because it has the same measurement criteria and criterion parts. However, it is important to highlight that PM systems have no use if they are not used as guidance to management decisions and not only for the awarding purpose.

Moreover, it was highlighted that EFQM is not strategic management tool therefore, is not a tool for implementing a strategy. This impose the need to use of BSC along with EFQM The scope of the Balanced Scorecard is necessary for the alignment of objectives from overall IDA to Division, Team to individual objectives. PM systems have no use if they are used for awarding purpose and not as guidance to management decisions.

4.8 Overall Comparative Performance Management Practices

While conducting the case studies, it was interesting to interview the key decision making managers as well as the executive and middle management representatives responsible of the operational implementation of the PMS.

Some pointed out that EFQM is strictly rigid and the balanced scorecard is much more "flexible", and they preferred to have a PMS which provides middle ground, being highly structured as in EFQM, but offering flexibility in the choice of measures relevant to the company. Providing an operational definition for the performance factors and linking the measurements to strategy would allow the organisation to secure better performance and a continuous improvement through a regular follow up and a follow up on the performance results linked to the policy and procedures taken. Hence, a performance measurement model combining the BSC and the EFQM is highly requested while being able to adapt with the company preferences.

Another barrier to a successful implementation of the PMS is the low levels of organisations maturity. Only one international organisation (IDA) has made reasonably good progress in implementing performance management. The two remaining organisations have made slow progress and are still in maturity zones 1 (BHF) and 2 (SOS). Below table 45 defines the maturity criteria for each level:

Table 45 Maturity Levels Definitions

Maturity Criteria					
0	**1**	**2**	**3**	**4**	**5**
Absence of a strategy, system or processes.	Basic strategy, system or processes in place but give insufficient guidance on business critical activities.	Limited processes are in place but cover some key elements of business activity but they are limited in scope.	System and processes are in place but need to be improved if the business is to grow and deliver a good standard of service.	Systems and processes are in place but need to be strengthened in some noncritical areas	Strong systems and processes in place which are measured to improve performance and to support the achievement of the business objectives delivering a high standard of service

Source: CMM Model, 1993

Table 46 below compares the three case study organisations with respect to key aspects of their business improvement strategy and performance measurement system in place.

Table 46 Comparison between performances systems adopted

	BHF FM	**SOS FM**	**IDA FM**
Geographical Focus	local	Multinational with locally owned	local
Motivation	Internal: Mother company requirement	External: client requirement	Internal: -Benchmarking To build a brand that is recognized as market leader, increase market shares and revenue and increase profit; Performance measurement adds benefits
Performance model adopted	BSC	EFQM	EFQM and BSC (Experimented with BSC and EFQM)
Implementation focus	Headquarter and Business units shared departments	Company-wide Initially in parts of company	Company-wide
Leadership	No leader defined	Head of Quality Department	Head of Quality Management
Resources	External Consultant and Dashboard co-coordinators	Full time department members and two part time employees	Full time department members
Communication and co-coordinating mechanisms	Workshops Task teams	Workshops Task teams	Workshops Task teams Steering committee
Data sources	Projects reviews Cost reporting system Customer review information	Internal survey Customer satisfaction survey	Project return, site visit and assessment BSC reporting Internal and customer satisfaction survey Employee satisfaction survey
Knowledge management	No	No	No (started but still not yet well established)

It is obvious that a structured approach in implementing a performance measurement and management system is crucial to achieve a successful improvement plan. As mentioned earlier, the following criteria were studied and analysed perceptively in the organisation case studies:

- ***Planning and Motivation.*** All case study organisations except one have, or are fine-tuning their strategy for performance management and are motivated to do so for a variety of reasons. While the first was externally driven by the clients, the second one was internally driven by its mother company; the third is driven by the continuous improvement and capability maturity management.

- ***Choice of Model.*** All the case study organisations had implemented a measurement system. BHF is the only who has not yet put in place EFQM model. IDA has experimented with both EFQM and BSC.

- ***Operationalization.*** Performance management is applied in different ways. While SOS FM have implemented it as a company-wide strategy, BHF has implemented the BSC in their headquarter offices and shared departments.

- ***Leadership and resources.*** Each case study has involved different level of resources to support the implementation including full-time and part-time staff, and in some cases special advocates – consultants.

- ***Performance measures.*** Most organisations rely widely on KPIs which include measures such as time, cost, clients and health and safety issues crucial for FM organisations. However, those KPIs are mainly lagging indicators reflecting past performance (backward looking) which is a serious problematic. Moreover, there are also difficulties in measuring certain criteria.

- ***Communication and coordinating mechanisms.*** Different techniques are used for coordination including workshops, working groups, local steering committees to report regularly on business improvement issues.

- ***Knowledge management aspect.*** The three organisations do not have knowledge management strategies; the last is fine-tuning its strategy, while the two others are planning to have one in the short term.

4.8.1 Key Findings related to the PM Systems adopted

Although the FM organisations in the UAE market are considered mature compared to the Middle East region, they are still having a challenge of formulating and implementing clear vision and strategy. The FM organisations' leaders neither translate the organisational vision into clear and measurable targets, nor properly communicate their strategy to their employees.

The performance management systems adopted are mainly the balanced scorecard and the EFQM. Organisations mainly adopt the EFQM and submit it to award purpose; they implement it for the client's recognition or social recognition (local award authorities or committees). Moreover, it is apparent in the three case studies that the performance measurement core principles and processes were not fully communicated among the higher management level and FM team members.

EFQM and BSC are two different concepts. The EFQM Excellence Model provides a wide and general view of performance. BSC pays attention to a fewer number of business areas that are linked to an organisation's strategic objectives; it has a clear focus on strategy and serves as the platform for other performance initiatives (e.g. EFQM). The BSC has dynamic design, since neither the criteria of performance assessment nor the selection of KPIs are predetermined. Therefore, BSC cannot be used for external benchmarking. Moreover, the greatest strength of EFQM over BSC is its ability to conduct benchmarking but the greatest weakness is the loss of the strategic focus.

EFQM is prescriptive and based on a static design (opposite to BSC). It consists of pre-set objectives. Some companies find EFQM much easier to use than BSC, since the methodology of self-assessment is prescribed). EFQM maintains the relationship with the environment and can signalize which business processes are (or not) aligned with changes in the competitive environment (external benchmarking).

*4.8.2 **Recommendations***

It is recommended that organisations should have a measurement system that performs both functions. The development of a comprehensive model for measuring performance in facilities management based on the principles of existing models such as the Balanced Scorecard and the EFQM Models.

The implementation is as important as the PMS design. Indeed, a PMS may be well designed, but poorly implemented which will lead to a failure. The political challenge including the resistance to change is so important to overcome the implementation issues and shall be considered as a measure itself.

Within the interviews with 3 company's senior managers, a few measurement criteria were identified as important in the performance measurement which do not necessarily exist in literature:

- **Culture:** FM organisations relying on human resources recruited mainly from Central and South Asia and Africa face a big issue in intercultural management within the organisation which impacts the overall employee and organisation performance. Employee retention and loyalty construction is of an important influence.

- **Software and technologies:** The rapid advance in technology and CAFM software has influenced the FM service provider performance. The use of such technologies and mobile solutions shall be monitored and weighted in the performance management assessment.

- **External Awards** are of a great importance for the company to position itself. Many interviewees declared their demotivation to implement a performance system if it is not linked to the external environment and allows them a certain level of benchmarking with their competitors.

- **Mobilization :** mobilization and readiness has been highlighted to be considered a critical success factor to be measured

- **Environmental factors** sustainability and energy should be integrated in the performance measurement system. Nowadays, green initiatives are considered as an important aspect in the FM companies that supposed to be measured.

- Last but not least, **corporate social responsibility** and community commitment is also a performance factor that the FM shall be considered since they deal with places, buildings and ameliorate people's experience.

4.9 Chapter Conclusion

In this chapter, semi structured interviews and three case studies were carried out to achieve the third objective of the study and explore the current performance measurement systems in the FM industry, and review how performance is measured in the FM organisations in the UAE .This objective was achieved by seeking the information about the current PM practices, the challenges and barriers and the expectations of the FM practitioners with regards to the optimum performance measurement model.

This chapter has indicated that the FM industry in UAE is still lacking in performance guidelines and shows practical evidence on the status of performance management in the UAE facilities management industry. Moreover, In spite of the usage of EFQM and BSC models in some of the large organisations, a need was highlighted for a comprehensive Performance Management model representing performance issues specifically for facilities management. This reinforced the study rational and was a base along with the conducted literature review to show the need of developing a model that is comprehensive and containing the integrated measures from the different models used and any additional measures suggested by the FM experts.

Chapter 5 – CONCEPTUAL PERFORMANCE MEASUREMENT MODEL DEVELOPMENT

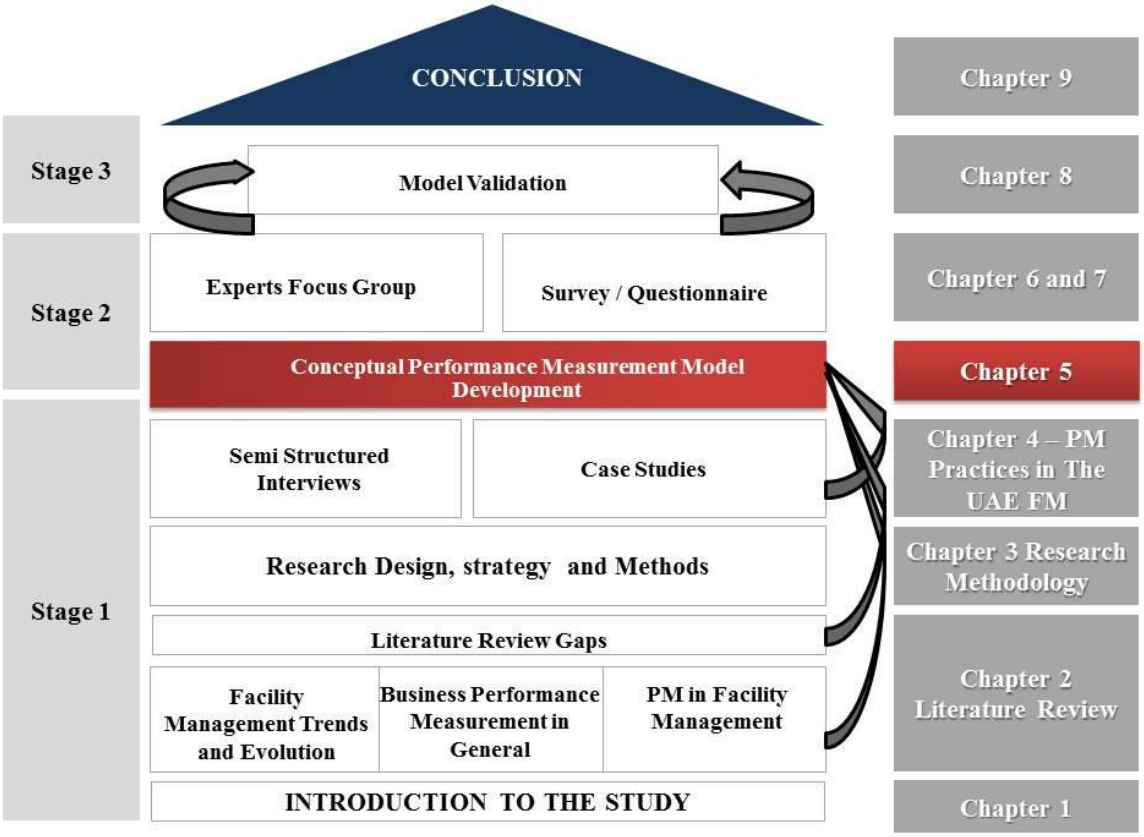


Figure 33 Research Structure – Chapter 5 Conceptual PM model development

5.1 Introduction

The previous chapters studied the existing performance management models and models in general and in the facilities management industry in particular this was done through reviewing the relevant literature, and conducting interviews and case studies.

As indicated in figure 33, this chapter handles the process of formulation of the conceptual PM model that can enhance performance management and monitoring within the FM industry by leveraging on the literature review, semi-structured interviews and case studies findings; where the model format was defined performance criteria and measures were identified.

5.2 Differentiating a Performance Measurement Framework, Model and System

Bassioni et al. (2004) differentiated between Performance Measurement Framework, Model and System. They defined performance measurement framework as a theoretical set of guidelines used as a generic method of measuring performance. However, a performance measurement model, is in essence a framework, but has requirements that are more rigid, such as defining the performance measures to be used. Moreover, Performance measurement system is used to describe the actual implementation of a performance measurement framework/model in the organisation.

As an example, the Balanced Scorecard can be considered a framework because it shows only general perspectives of measurement, however, the EFQM can be considered both a framework and a model, as it not only shows the criteria of measurement, but also what to measure within the criteria. The implementation of the Balanced Scorecard (framework) or EFQM (Model) within the organisation can be considered as a performance measurement system.

Based on the above definitions, this study developed a measurement model to be used within the performance measurement system to measure the organisation performance.

5.3 Characteristics of Successful Model

The need of a model for measuring the FM performance was well highlighted in literature (Chotipanich, 2004). The reason behind it lies in the fact that implementing such model ensures a proper development of business performance logic and recognizes the gaps and lags of the past performance (Neely *et al*., 1997).

Bassioni (2005) highlighted that the development of the performance measurement model should benefit from the existing literature contributions. Based on this, it was decided to follow recommended steps highlighted by a number of authors who summarised the characteristics of the performance measurement models and frameworks. Within this context, Folan and Browne (2005) claimed that recommendations concerning performance measurement can be split into two main areas:

1. The design of a performance measurement model
2. The performance measures

The first area explores the recommendations that have been advocated related to the design and development of performance measurement frameworks and models, while the second concentrates on the requirements of what constitutes good performance measures (Folan and Browne, 2005).

Moreover, as per a comprehensive review of literature, a long list of performance measurement characteristics have been produced with shortlist of fourteen criteria that are categorized in three main categories which defines a successful PM model:

1. The overall performance measurement model
   Comprehensiveness, Adaptable, Benchmarking capability, Usefulness of the model and Focused on improvement

2. The performance measures
   Linked to strategy, Clear, Effective – useful, Relevant

3. The structure of the model
   Balanced, logical structure, Clarity of the model, Comprehensibility, Weightage

Each criterion was referred to the source from respective literature review as shown in tables (47, 48, and 49). These criteria were used in chapter 8 to validate the proposed model.

Table 47 Overall Model characteristics

Overall Model	
Comprehensiveness	Kegan et al. (1989),Kaplan and Norton (1992); Neely (1997); Bititci (2005); Cocca (2010)
Adaptable	Keegan (1989); Fitzgerald et al. (1991); Neely. (1997); Bititci et al. (2005); Cocca (2010)
Benchmarking capability	Noble Ghalayini (1997); Hudson et al. (2001)
Usefulness of the model	Neely. (1997); Hudson et al. (2001); Cocca and Alberti (2010)
Focused on improvement	Fitzgerald etal.(1991); GhalayiniNoble (1996); Kaplan and Norton (1992); Neely (1997); Hudson (2001); Bititci (2005)

Table 48 Performance Measures characteristics

Performance Measures	
Linked to strategy	Globerson (1985); Maskell (1989); Lynch (1991); Fitzgerald et al. (1991); Neely. (1997); Hudson et al. (2001); Bititci (2005); Cocca (2010)
Clear	Neely (1997), Hudson (2001); Alberti and Cocca (2011)
Effective/useful	Bititci (1997), Neely. (1997); Hudson (2001)
Relevant	Noble and Ghalayini (1996),Hudson (2001), Alberti and Cocca (2011)

Table 49 Model Structure characteristics

Model Structure	
Balanced	Maskell (1989); Kaplan and Norton (1992 Ghalayini 1996);Neely (1997);
Logical structure	Maskell (1989); Ghalayini and Noble (1996); Neely (1997);
Clarity of the model	Neely. (1997); Hudson et al. (2001); Cocca (2010)
Comprehensibility	Gass(1983);Brown (1996); Macal (2005)Najmi (2005)
Weightage	Ghalayini (1996), Neely. (1997), Hudson et al. (2001),Sharp(2004)

5.4 Format/Design of a performance measurement model

The proposed model consisted of three levels shown in figure 34: Performance perspectives, performance dimensions and performance measures

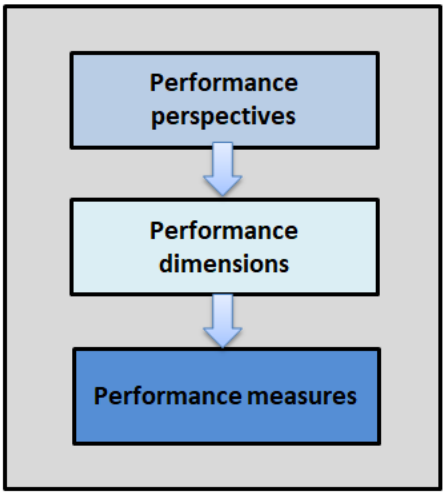


Figure 34 Performance measurement model levels

5.4.1 First Level: Two perspectives

As shown in figure 35, the first level of the proposed model consists of two main perspectives: Enablers and Results. This design followed the "EFQM" model (2007) and the "Results and Determinants" model developed by Fitzgerald *et al.* (1991), where business performance has two main perspectives: "Enablers", consists of lagging indicators that cover what an organisation does, and "Results", leading indicators which cover what an organisation achieves (Calvo-Mora et al., 2005). .

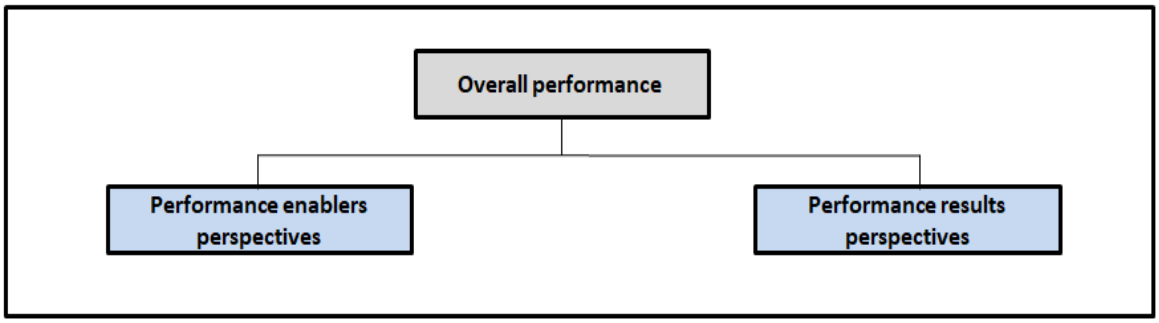


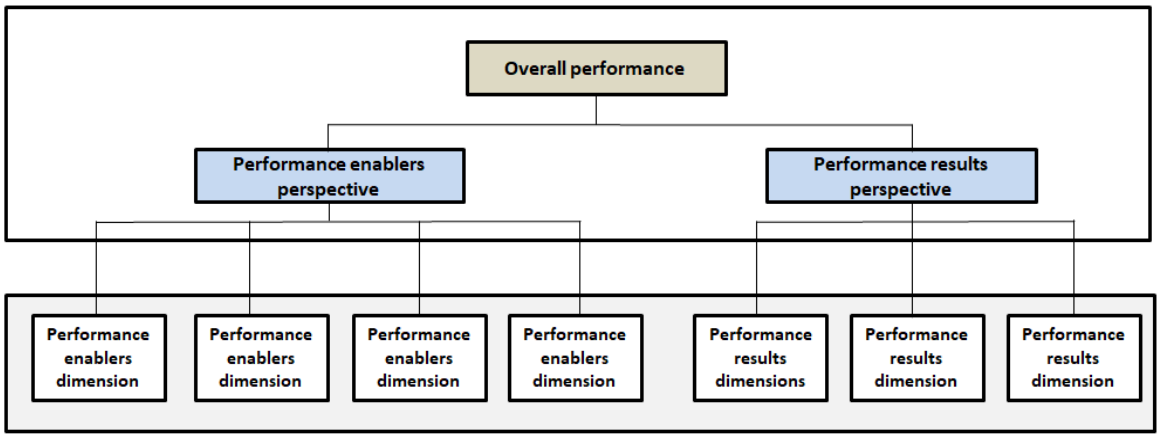
Figure 35 First Level: Two perspectives

5.4.2 Second Level: Multi-Dimensions Performance Criteria

It was highlighted in the initial semi structured interviews, and in literature review by Neely *et al*. (2000), that one of the main weaknesses of the performance measurement frameworks and models used by organisations is the adoption of unidimensional focus, this issue can be overcome if the organisation adopts a balanced and multi-dimensional set of measures that aim to monitor the performance quality (Kaplan and Norton, 1992).

Based on this, the performance measurement model was designed to reflect an organisation's multidimensional criteria like in "Performance Measurement Matrix" by Keegan et al., (1989), and the balanced scorecard developed by Kaplan and Norton (1992), and the "Performance Prism "model developed by Neely *et al.* (2001), who said that the performance measurement model should explain the relationships among the measures forming multiple dimensions of business performance (Neely *et al.*, 2001).

Figure 36 Second Level: Multi-Dimensions Performance Criteria



5.4.3 Third Level: Performance Measures

This level includes the set of performance measures. Fry (1995) defined performance measures as means of tracking performance. Thus, it is crucial for FM practitioners to have a set of performance measures that is appropriate for measuring their service delivery performance. These performance measures can be structured and grouped in such a way to show particular dimensions of performance (Folan and Browne, 2005).

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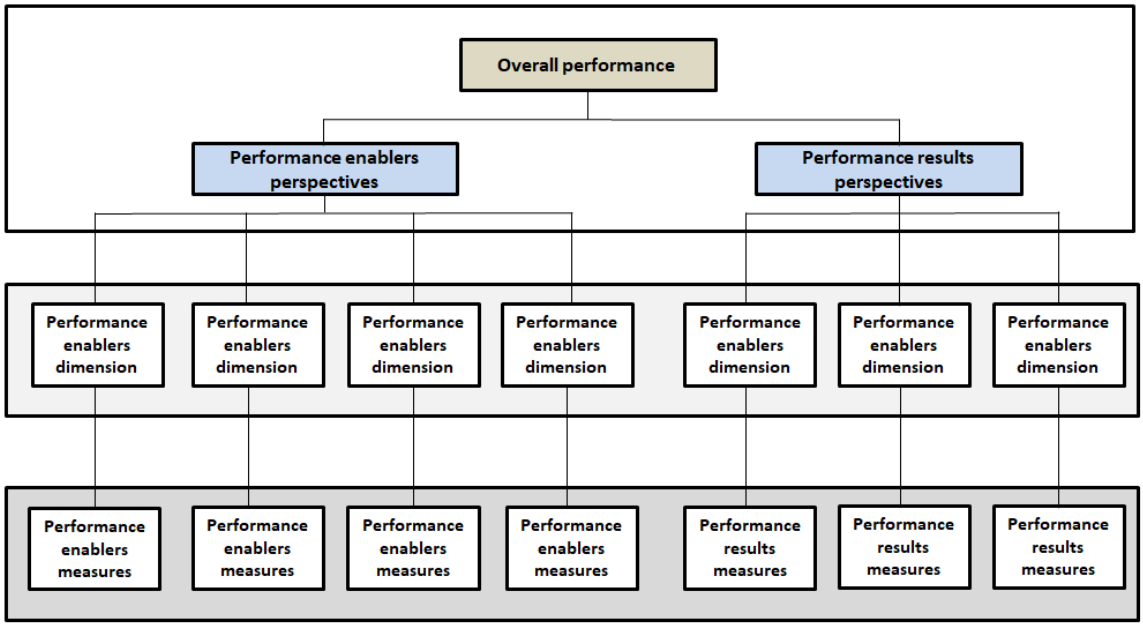
Difficulties in identifying the appropriate measures were highlighted in the initial semi structured interviews, interviewees clearly mentioned that establishing the proper performance measures is the most important part of the PM system; this supported Neely et al. (2000) view who mentioned that managers face difficulties in selecting the suitable performance measures on which to rely for their services, so they highly recommended to propose predefined performance measures. Based on this, the third level of the performance measurement model consisted of predefined set of performance measures that can be used in the FM industry.

Figure 37 Third Level: Performance Measures



5.5 Selecting the performance dimensions and measures

A distinction shall be made between performance measures and performance dimension. Performance measures are characteristics or attributes against which performance is measured whereas performance dimension are set of measures which have common features (Myeda, 2013).

5.5.1 Performance Dimensions

Performance measurement model is recommended to be a multi-dimensional set of performance measures (Neely *et al*., 2003). It is quite a complex task to define the optimal number and appropriate type of performance measures to be used in the PM model, so Tangen (2003) proposed to explore in what situations the frequently used performance measures are appropriate and then classify them into categories to be used.

In this model formulation, the researcher listed the performance dimensions reviewed in the literature, this was presented in literature review chapter (section 2.3.8, table 9), and then the dimensions were combined and presented in table 50 below:

Table 50 Summary of main performance Dimensions

Proposed measurement items	References from literature
Leadership	EFQM Model(1989);
Policy and Strategy	EFQM Model(1989); Liyanage and Egbu (2008);
People/ Employee Satisfaction/Human Resources	EFQM Model(1989); Brown et al. (1994); Cupello (1994); Hudson et al. (2001); Neely (2002); Kaplan and Norton (1992);
Partnership and Resources	EFQM Model(1989);
Process/Procedures/Standards/Operational	EFQM Model(1989); Liyanage and Egbu (2008); Brown et al. (1994); Atkins and Brooks (2006);
Society/Community Results	EFQM Model(1989);
Business /Financial Results	Sink and Tuttle (1989); EFQM Model(1989);Kaplan and Norton (1992); Neely (2002); Brown et al. (1994); Cupello (1994); Hudson et al. (2001); Atkins and Brooks (2006); Lavy et al. (2010) Abdulrahman (2010); Meng and Minogue (2011)
Customer	EFQM Model(1989);Kaplan and Norton (1992); Neely (2002); Brown et al. (1994); Cupello (1994); Hudson et al. (2001); Atkins and Brooks (2006); Meng and Minogue (2011)
Project Efficiency/Productivity/Effectiveness Efficiency	Sink and Tuttle (1989); Abdulrahman (2010);
Environment	Hinks and McNay (1999); Meng and Minogue (2011)
Change Management	Hinks and McNay (1999)
Investors	Neely (2002)
Supplier Performance	Cupello (1994)
Health and Safety	Meng and Minogue (2011)
IT application	Meng and Minogue (2011)
Innovation and Learning and Growth/Preparing for the future	Sink and Tuttle (1989); Kaplan and Norton (1992); Atkins and Brooks (2006); Abdulrahman (2010)

Table 50 shows the dimensions generated from literature review. Leadership has been well documented and acknowledged as the main driver of effective performance as in EFQM (Anderson et al. 1995; Wilson and Collier 2000; and Zairi 1999).Policy and strategy were highlighted by Liyanage and Egbu (2008), who mentioned that operation services are managed under asset management but the relevant standards and regulations related to the FM services are monitored under policy and strategic planning. In addition, stress is placed on human resources, which is related to employee satisfaction (Kaplan and Norton, 1992; Cupello, 1994; Brown et al., 1994; Wordsworth, 2001; Neely, 2002; Atkins and Brooks, 2006).The presence of teamwork among employees was seen as necessary and therefore its encouragement through ensuring the satisfaction of the staff is highly recommended.

Moreover, the performance dimensions related to the external stakeholders were included: customers satisfaction and suppliers performance management from one side (Cupello, 1994), and the community and social responsibilities from the other (Brown et al., 1994). Cupello (1994) highlighted that the relationship between the service provider and all stakeholders should be based on partnership especially in FM projects which is mainly a service delivery based industry.

Additionally, the model must have a view of connection between the internal efficiency of organisational performance and its impact on the external effectiveness and the way external stakeholders and customers might recognize it. This was highlighted by Sink and Tuttle (1989), Abdulrahman (2010) and the EFQM-Excellence Model (1992).

Furthermore, many authors believe that innovation, and learning and growth are among the critical dimensions in measuring performance. (Sink and Tuttle, 1989; Kaplan and Norton, 1992; Wordsworth, 2001; Atkins and Brooks, 2006),

FM managers also should take into consideration their business benefits, financial results and shareholders (investors) objectives to eventually set a primary outcome measurement for these objectives (Sink and Tuttle 1989; Kaplan and Norton, 1992; Brown et al., 1994; Wordsworth, 2001; Neely, 2002; Atkins and Brooks, 2006). These outcome measurements should, however, represent an FM organisation's objectives which includes its services and products (Amaratunga and Baldry, 2003).

Also Meng and Minogue (2011) stated that organisations should consider IT applications as one of the dimensions to consider within PM system, especially with recent advancement in technology. Furthermore, Sustainability and Health and Safety were recently recognized as a key element of measuring performance (Abdulrahman, 2010; Meng and Minogue, 2011).

5.5.2 Combining Performance measures gathered from Literature Review and Case studies

Performance measures are applied to provide feedback, give an understanding, encourage intrinsic motivation and stimulate continuous improvement (Lynch and Cross, 1991; Neely *et al*., 1996). To decide which performance measures to include, the Performance Measurement Model shall take into consideration the FM procedures, and the measures should be relevant, clearly defined, and simple to understand, easy to put into practice and aligned with the organisation's goals and objectives (Hudson *et al*., 2001).

In fact, the facilities management lacks a systematic process in defining applicable performance measures (Holloway *et al*., 1999). Misunderstanding which areas to target, and which areas to provide priorities in FM are also considered a complication in applying performance measures (Amaratunga and Baldry, 2000b). Accordingly, FM specialities must agree upon a set of performance measures to help them to measure their service delivery performance.

This study leveraged on the measures identified in previous researches and case studies. Based on this a combination of performance measures were identified and the duplicate measures were removed. The combination of performance measures from relevant literature review, case studies and the existing measurement models and models generated a list of 77 performance measures. Table 51 presents a synthesis of the combined success measures.

Table 51 Combined Performance Measures

Proposed measures	References	Proposed measures	References
Business Continuity	Hinks and McNay (1999)	Customer relationships Management	EFQM (1989); Abdulrahman (2010);
Suitability of premises and functional environment	Hinks and McNay (1999)	Customer Results Performance Indicators	EFQM (1989); Amaratunga (2004)
Workforce and Teamwork Management	Amaratunga (2004; Abdulrahman (2010)	Employees Plans linked to Strategy	EFQM (1989)
Capital Asset management	Amaratunga (2004)	People are rewarded, recognised and cared for	EFQM (1989)
Satisfactory physical working conditions	Hinks and McNay (1999)	Information and knowledge are managed to support effective decision making	EFQM (1989); Hinks and McNay (1999)
Strategic facilities information	Amaratunga (2004): Hinks and McNay (1999)	Products are effectively promoted and marketed	EFQM (1989)
Service partnerships	Amaratunga (2004)	Society Results Performance Indicators.	EFQM (1989)
Staff training and development	Amaratunga (2004)	Buildings, equipment, materials and natural resources are managed in a sustainable way	EFQM (1989); Hinks and McNay (1999)
People communicate effectively throughout the organisation.	Hinks and McNay (1999);EFQM (1989)	Technology is managed to support the delivery of strategy	EFQM (1989): Abdulrahman (2010)
Facilities management culture	Amaratunga (2004)	Excellence Culture Reinforcement by Leaders	EFQM Model(1989)
Innovation	Hudson et al.(2001); Amaratunga (2004)	Leaders develop the mission, vision and values	EFQM Model(1989)
Achievement of completion deadlines	Hinks and McNay (1999)	Leaders engage with external stakeholders.	EFQM Model(1989)
Competence of staff	Hinks and McNay (1999)	Leaders Performance Management	EFQM Model(1989)
Reoccurring business	Abdulrahman (2010)	Strategy based on understanding the stakeholders needs	EFQM Model(1989)
Team satisfaction	Abdulrahman (2010)	Strategy is communicated, implemented and monitored.	EFQM Model(1989)
Flexibility to users	Abdulrahman (2010)	Strategy is developed, reviewed and updated.	EFQM Model(1989)
Whole life cost	Abdulrahman (2010)	Supply chain management	Amaratunga (2004)
Contract management	Amaratunga (2004)	Risk Management	Amaratunga (2004)
Cash flow	Hudson et al.(2001)	Health and Safety	Lavy et al. (2010);
Mobilization	Case Studies	External Awards	Case Studies
Inventory performance	Hudson et al.(2001)	Building physical condition	Lavy et al. (2010)
Market share	Hudson et al.(2001)	Indoor Environment Quality	Lavy et al. (2010); Hinks and McNay (1999)
New product introduction	Hudson et al.(2001)	Security Site and location	Lavy et al. (2010)
Process time	Hudson et al.(2001)	Property and real estate	Lavy et al. (2010)
Profitability	Amaratunga (2004); Hudson et al.(2001)	Turnover rate	Lavy et al. (2010)
Resource utilization	Hudson et al.(2001)	Productivity	Lavy et al. (2010); Hudson et al.(2001)
Product Performance	Hudson et al.(2001); EFQM Model(1989)	Accessibility for Disabled	Lavy et al. (2010)
Effective implementation of changes	Liyanage and Egbu (2008)	Adequacy of space	Lavy et al. (2010)
Staff commitment	Meng and Minogue (2011)	Churn rate and churn costs	Lavy et al. (2010)
Adherence to policies	Liyanage and Egbu (2008)	Easy to use products and services	Loosemore and Hsin (2001)
Appropriateness and suitability of service levels	Liyanage and Egbu (2008)	Revenue growth	Loosemore and Hsin (2001)
Appropriateness and suitability of standards	Liyanage and Egbu (2008)	Client-service provider relationship	Meng and Minogue (2011)
Appropriateness of policies	Liyanage and Egbu (2008)	Return on average assets	Loosemore and Hsin (2001)
Corporate Social Responsibility	Case Studies	Benchmarking	Case Studies
Necessary amendment and revision of policies	Liyanage and Egbu (2008)	Human resources	Loosemore and Hsin (2001): Amaratunga (2004)
Policies clearly defined and communicated to the staff	Liyanage and Egbu (2008)	Ordinary dividends	Loosemore and Hsin (2001)
Roles and responsibilities are clearly defined	Liyanage and Egbu (2008)	Value for money	Hinks and McNay (1999); Loosemore and Hsin (2001)
Service Levels Communicated effectively to all staff	Liyanage and Egbu (2008)	Quality of end product	Hinks and McNay (1999)
Standards amendment and revision on a regular basis	Liyanage and Egbu (2008)		

Each of the studies described in the literature provides various findings and outputs on their proposed set of measures, which they believe are appropriate and practical for FM services. Hinks and McNay (1999) proposed a PMS based on the management-by-variance principle. They were among the first to propose a PMS. Seven main performance parameters were determined: business benefits, equipment, space, environment, change management, maintenance/services and general, with respective indicators. The study also emphasised prioritising the indicators, which correlated the satisfaction from customers and premises. Loosemore and Hsin (2001) have explored the relationship between FM and core objectives by examining the KPIs used the measurements listed for the government sector with a combination of both financial and non-financial metrics. Moreover, Liyana and Egbu (2008) have proposed a PM model that can be used for FM service in the healthcare sector. The performance metrics proposed are centred on 4 main dimensions: control of HAI, organisation policy, service levels and standards. The indicators are focused on the quality, implementation control and appropriateness with an absence of the financial part.

Lavy *et al*. (2010) might have introduced a more inclusive PM model among all the model presented as they identify the appropriate 15 KPIs for specific FM services grouped into four performance dimensions namely the financial, the functional, the physical and survey-based. In addition to this, Meng and Minogue (2011) have conducted a survey of 73 companies with the aim of identifying the most important performance indicators used by them. Based on the Performance Model principle, the study suggests 10 important performance indicators, namely client satisfaction, cost-effectiveness, response time, service reliability, health, safety, environmental compliance, staff commitment, client-service provider relationship and IT application.

5.6 Conclusion:

This chapter handled the formulation process of the conceptual performance measurement model. The formulation consisted of two stages: The first stage identified the design or the format of the model which consisted of three levels (performance perspectives, performance dimensions and performance measures). The second stage identified the performance dimensions and measures to be used in the proposed model, identification of these components were done by the combining performance dimensions and measures

from relevant literature review, case studies and the existing measurement frameworks and models. As a result, 16 performance dimensions and 77 of performance measures were generated.

In the following chapters, the measures were grouped within the proposed dimensions and perspectives, and the appropriateness of the proposed measures were evaluated within the UAE market. A focus group workshop followed by questionnaire survey explored the opinion of facilities management professionals in the UAE market, in order to validate the proposed model, adjust what is needed to make it appropriate for the FM industry in the UAE.

Chapter 6- FOCUS GROUP DATA COLLECTION AND FINDINGS

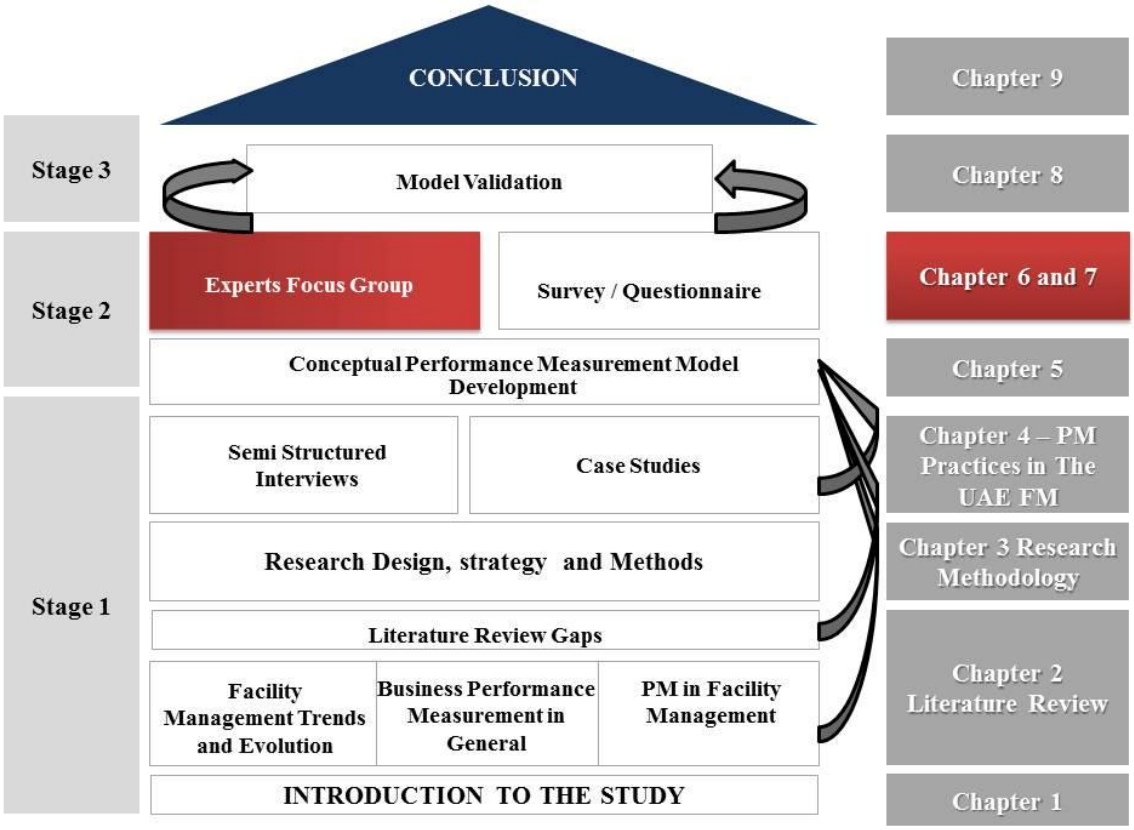


Figure 38 Research Structure - Chapter 6 Focus Group

6.1 Introduction

This chapter as shown in figure 38 is the Focus Group chapter, it presents the objectives and purpose of using the focus group method, the process of the workshop and the results generated. Finally, the findings were presented providing a revised list of categorized performance measures. The latter was further investigated and validated in the next chapters.

The outcomes of the literature review and the FM practices shown in case studies and exploratory interviews were used to build the performance measurement model with 77 Measures. As mentioned in the methodology chapter 3, a focus group explored the opinion of facilities management professionals and experts in the UAE and regional market, in order to validate the proposed model, and to adjust what is needed to make it appropriate for the FM industry in the UAE.

6.2 Focus group objectives

As presented in chapter three, various reasons or advantages push the researcher to employ a focus groups method. Among those advantages are the motivation and the interaction of the invited experts and participants taking part in a collective environment to discuss issues of concern to allow the research to achieve productive and provide more useful information comparing to individual interviews (Vaughn *et al.*, 1996; Litosseliti, 2003).

In this study, the researcher aimed to get input from the focus group workshop to revise the PMS proposed model proposed from the stage one of data collection: the literature review and the case studies findings.

Additionally, the second objective was to generate a list of success criteria and performance measures that are well-suited to the FM organisations' performance. Indeed, although the literature review of general business performance measurement has revealed a number of performance dimensions and measures, they were not all compatible to the FM sector.

Thus, the focus group was adopted to explore the opinions of experts, well knowledgeable professionals as well as highly experienced senior managers which can provide insights about the UAE FM markets and its particularities with regards with the performance measurement needs and challenges.

Based on the above, the main objectives of the focus group workshops are summarised below:

1. Review the performance measures types/Dimensions identified in the literature;
2. Explore the experts' opinions on the measures proposed for the model;
3. Agree on renaming the measures to simplify them and make them relevant to the FM industry;
4. Generate a list of any additional performance measures;
5. Categorize the measures into the identified dimensions and into the two main perspectives: Enablers and Results measures.

6.3 Focus group workshop process

Since focus groups are in depth and carefully planned group interviews mingling relatively homogenous groups to obtain perceptions on a defined problematic and to somehow answer the researcher's inquiries around specific topics (Hughes and DuMont, 1993), the process of conducting those workshops is of a great importance. It follows logical procedures from selecting participants to organizing the workshop's events with all its subsequent details of venues, dates, emails invitations and coordination to ensuring as well a good interaction between the participants (Frey and Fontana, 1993).

The focus group workshop employed in this study was facilitated by the researcher. Easterby-Smith et al. (2008) recommended, in a focus group workshop, the researcher shall provide a rationale for the workshop to the participants, and create and promote convenient atmosphere for discussions (Smithson, 2000). The focus group in this study sought to examine the performance measures used and to discuss performance measures criteria that need to be added. The facilitated workshop created an environment for open arguments and steered discussions between the professionals with various backgrounds.

6.3.1 Participants Sample and Selection

As discussed in the methodology chapter, selecting participants for a focus-group workshop is a big challenge as the researcher spends considerable time in reviewing the candidates' profiles as he needs to ensure a certain harmony during the workshop. Therefore, in this study, the selection the participants was based on "purposive sampling" with regards with their familiarity with the topic as well as their extensive knowledge in the performance management and/ or their high expertise in the FM industry.

The researcher facilitated the focus group workshop and provided a rationale for the workshop and the objectives to be achieved. General information about the participants was gathered, in addition to the familiarity of each industry practitioner with performance measurement models.

After many alternative dates were discussed, the researcher managed to arrange a workshop that met all participants' calendar. Seven participants of which designations are shown in table 52 joined the workshop and discussed openly about the performance measurement in the FM field.

Table 52 Participants Profile

Sl #	Designation	Organisation
1	FM Consultant	FM consultancy
2	Operations Manager	Facilities Management Service Provider
3	FM Director	Leading Property Developer Client
4	General Manager	Facilities Management -Service Provider
5	Centre of Excellence Director	Facilities Management -Service Provider
6	Quality Manager	Facilities Management Service Provider
7	Senior Director Quality and Outsourcing	FM Agent-Client Representative

As discussed in the methodology chapter section, two of the focus group participants were interviewed during the initial stage and they gave their opinion on the current status of facilities management in the UAE and the application of performance measurements within the industry.

6.3.2 Focus Group Results and Analysis

The content of the workshop session was designed to achieve the objectives set earlier. The researcher continued in an inductive approach by gathering data describing the review of the performance measures existing from the literature and then exploring participant's opinions of the proposed performance measurement model.

As shown earlier, the combination of performance measures from relevant literature review, case studies and the existing measurement model generated a list of 16 criteria and 77 measures. Because of the limited duration of the meeting, and in order to make the discussion smooth and fruitful, the list of these criteria and measures and the objectives of the workshop were provided to the participants before the meeting. This allowed the participants to preview them and to be ready for the discussions.

Experts reviewed the performance measures and criteria identified in the literature, then rated each performance measure according to their importance in achieving organisational business success, renamed the measures to simplify them and make them suitable to the FM industry, and were asked for any missing factors in the model. Performance

measures were categorized as enablers or results and grouped in to the identified criteria throughout the workshop to facilitate comprehension of the model.

The workshop proceeded as per the researcher planned objectives. It was made of 3 main tasks:

Task One: Review the performance measures types/criteria identified in the literature.

The participants were asked to discuss about main performance criteria gathered from the literature review and which are presented in table 53:

Table 53 Performance measures criteria identified by Literature Review

Leadership
Policy and Strategy
People/Employee Satisfaction/Human Resources
Partnership and Resources
Process/Procedures/Standards/Operational
Society/Community Results
Business/Financial Results
Customer
Project Efficiency/Productivity/Effectiveness Efficiency
Environment
Change Management
Investors
Supplier Performance
Health and safety
IT application

Based on the list given in table 53, the participants agreed to:

1. Keep four criteria as they are (Leadership, Policy and Strategy, Partnership and Resources, Society/Community Results);

2. Combine some others such as “change management” which was combined to “Leadership” and “Processes and Procedures”; “Health and Safety” with “Environment” ; “Investors” with “Financial Results” and “Supplier Performance” with “Partnership and resources”;

3. Rename seven criteria such as “IT application” into “Technology” (see table 46).

Table 54 Focus Group Responses

Before Focus Group	After Focus Group
People/employee satisfaction/Human Resources	Human Resources
Process, Procedures, standards/Operational	Processes and Procedures
Business/Financial Results	Financial Results
Customer	Customer Satisfaction
Project Efficiency/Productivity/Effectiveness and Efficiency	Productivity
IT application	Technology
Innovation and Learning and Growth/Preparing for the future	Learning and Growth
Leadership	Leadership
Policy and Strategy	Policy and Strategy
Partnership and Resources	Partnership and Resources
Society/Community Results	Society/Community Results
Environment	Health/Safety and Environment (HSE)
Health and safety	Health/Safety and Environment (HSE)
Change Management	Can be with Leadership and Processes
Investors	Can be with Financial Results
Supplier Performance	Can be with Partnership and resources

At the end of the first session, the new performance criteria list was agreed as follows (table 55):

Table 55 Performance Criteria list after Focus Group

Performance Measurement Criteria	
Leadership	Partnership and Resources
Policy and Strategy	Health/Safety and Environment (HSE)
Processes and Procedures	Technology
Productivity	Society/Community Results
Human Resources	Financial Results
Learning and Growth	Customer Satisfaction

Task Two: Performance Measures

Second task of the focus group workshop includes three subtasks: Explore the experts' opinions on the measures proposed for the model; agree on renaming the measures to simplify them and make them relevant to the FM industry; and generate a list of any additional performance measures;

1. **To explore the experts' opinions on the measures proposed for the model**

During the second task of the workshop the experts were asked to assess and evaluate the proposed measures. Then, they were asked to allocate to each measure, based on their expertise and knowledge, an importance pointer (H) if it has a high importance, (M) for medium importance and (L) for low importance. Table 56 shows full detailed ranking of each measure. 77 measures were reviewed as proposed in the conceptual model, of which 55 are assigned of "high importance" as shown in table 57, 8 were identified as of "medium importance", 14 as "low", so it was decided to remove 22 and keep only the measures with high importance ranking.

Table 56 Performance Measures Ranked by Focus Group

Performance Measure	Rank		Performance Measure	Rank
Business Continuity	H		Customer relationships Management	H
Suitability of premises and functional environment	L		Customer Results Performance Indicators.	H
Workforce and Teamwork Management	H		Employees Plans linked to Strategy	M
Capital Asset management	L		Employees Recognition	H
Satisfactory physical working conditions	L		Information and Knowledge Management	H
Strategic facilities information	L		Marketing Management	H
Service partnerships	L		Society Results Performance Indicators.	H
Staff training and development	H		Sustainable Management	H
Effective Internal communication	H		Technology Management	H
Facilities management culture	H		Excellence Culture Reinforcement by Leaders	H
Innovation	H		Leaders develop the mission, vision and values	H
Achievement of completion deadlines	H		Leaders engage with external stakeholders.	H
Competence of staff	H		Leaders Performance Management	H
Reoccurring business	H		Strategy based on understanding the stakeholders needs	H
Team satisfaction	H		Strategy is communicated, implemented and monitored.	H
Flexibility to users	L		Strategy is developed, reviewed and updated.	H
Whole life cost	L		Supply chain management	H
Contract management	H		Risk Management	H
Cash flow	H		Health and Safety	H
Mobilization	H		External Awards	H
Inventory performance	H		Building physical condition	L
Market share	H		Indoor Environment Quality	H
New Service introduction	H		Security Site and location	M
Process time	M		Property and real estate	L
Profitability	H		Turnover rate	H
Resource utilization	H		Productivity	L
Service Delivery Performance	H		Accessibility for Disabled	L
Effective implementation of changes	H		Adequacy of space	L
Staff commitment	H		Churn rate and churn costs	M
Adherence to policies	H		Easy to use products and services	L
Appropriateness and suitability of service levels	H		Revenue growth	H
Appropriateness and suitability of standards	H		Client-service provider relationship	H
Appropriateness of policies	H		Return on average assets	M
Corporate Social Responsibility	H		Benchmarking	H
Necessary amendment and revision of policies	H		Human resources	M
Policies clearly defined and communicated to the staff	H		Ordinary dividends	M
Roles and responsibilities are clearly defined	H		Value for money	H
Service Levels Communicated effectively to all staff	H		Service reliability	H
Standards Necessary amendment and revision on a regular basis	H			

Table 57 Summary of the Performance Measures Ranking

Total Measures	**77**
H	55
M	8
L	14
Total Removed	22
Remaining	**55**

2. **Agree on renaming the Measures to simplify them and make them relevant to FM industry**

While reviewing the performance measures list, the participants discussed also the usefulness of each measure and its practical features in the FM. They were asked to share any experience in using it and give the FM relevant term. For instance, some measures were renamed to match the FM characteristics such as "Service reliability" instead of "Quality of end product" as the latter go more with the manufacturing industry or to summarize a long statement such as "Sustainable Management" replacing "Buildings, equipment, materials and natural resources are managed in a sustainable way". Table 58 shows the renamed measures.

Table 58 Renamed measures

Before Focus Group	**After Focus Group**
Information and knowledge are managed to support effective decision making	Information and Knowledge Management
People communicate effectively throughout the organisation.	Effective Internal Communication
People are rewarded, recognised and cared for	Employees Recognition
Buildings, equipment, materials and natural resources are managed in a sustainable way.	Sustainable Management
Technology is managed to support the delivery of strategy	Technology Management
Products are effectively promoted and marketed	Marketing Management
New product introduction	New service introduction
Product Performance	Service Delivery Performance
Quality of end product	Service reliability

3. **To generate a list of any additional performance measures**

During their classifications and discussions, the researcher asked the experts to advise if there are any additional measures that do not exist which should be incorporated in the

PM model. For each indicator suggested, the grounds for its usefulness were deliberated before the final decision on its addition to be made.

Even though, the participants confirmed that the proposed measures list was quite comprehensive and covered almost all the performance aspects, the discussions revealed nine additional measures that should be inserted (table 59).

Table 59 Additional Measures proposed during the Focus Group

Focus Group		
1	Planning and Scheduling	Additional
2	Waste Management	Additional
3	Assets Maintenance Management	Additional
4	CAFM Usage	Additional
5	Help Desk/Call Centre Performance	Additional
6	Statuary Compliance	Additional
7	Periodic Health and Safety Audit	Additional

Task Three: Performance measures categorization

During the third Task, the participants agreed on the measures categorization. They were asked to link each measure to the respective criteria. Each criteria with its measures was then categorized into the two performance perspectives: performance enablers (drivers) and performance results. As shown in table 60, the results show 9 criteria/dimensions with 51 measures as enablers and 3 criteria/dimensions with 11 measures as results.

This was the final task of the workshop and the list generated in tables 61 and 62 was considered the final outcome of the workshop.

Table 60 Performance Measures Allocation Summary

Enablers Total	51
Results Total	11
E and R Total	62

Table 61 Performance Measures Enablers

Enablers (51)				
1	Leadership		5	Human Resources
	Leaders develop the mission, vision and values			Planning and Scheduling
	Effective implementation of changes			Roles and responsibilities are clearly defined
	Leaders Performance Management			Employees Recognition
	Leaders engage with external Stakeholders.			Team satisfaction
	Excellence Culture Reinforcement by Leaders			Staff commitment
2	Policy and Strategy			Facilities management culture
	Adherence to policies			Competence of staff
	Appropriateness of policies			Staff training and development
	Strategy is based on understanding the stakeholders needs		6	Learning and Growth
	Strategy is developed, reviewed and updated.			New Service introduction
	Strategy is communicated, implemented and monitored.			Business Continuity
	Policies Necessary revised on a regular basis			Marketing Management
3	Processes and Procedures			Innovation
	Inventory performance			Benchmarking
	Risk Management		7	Partnership and Resources
	Standards Necessary revised on a regular basis			Appropriateness and suitability of service levels
	Effective Internal communication			Customer relationships Management
	Appropriateness and suitability of standards			Contract management
	Mobilization			Client-service provider relationship
	Assets maintenance Management			Supply chain Management
	Resource utilisation			
4	Productivity/Service Quality		8	Health , safety and Environment(HSE)
	Service Delivery Performance			Indoor Environment Quality
	Service reliability			Statuary Compliance
	Achievement of completion deadlines			Periodic Health and Safety audit
	Help Desk/Call centre Performance			Environmental Sustainability Management
	Workforce and Teamwork Management			Waste Management
				Health and Safety
			9	Technology
				Technology Management
				Information and Knowledge Management
				CAFM usage

Table 62 Performance Measures Enablers

Results(11)	
10	Society/Community Results
	Society Results Performance Indicators.
	External Awards
11	Financial Results
	Profitability
	Market share
	Cash flow
	Turnover rate
	Value for money
	Revenue growth
12	Customer Satisfaction
	Customer Results Performance Indicators.
	Reoccurring business
	Corporate Social Responsibility

6.3.3 Conclusion

This chapter presented the review of the conceptual model for measuring the performance of FM organisations by FM experts. To make this model specific to the FM organisations; a focus group workshop was undertaken involving FM experts and senior specialists in this subject. The focus group method was used as a preliminary step in the study to explore and gain more understanding of performance criteria that shape the successful FM organisations. The participants demonstrated that the model is comprehensive and feasible by confirming its measures and categorising them into criteria and perspectives. However, the participants proposed extra performance measures to the proposed model which was tested by a wider sample using a questionnaire survey to confirm that outcomes obtained at this stage of the research.

As a result, and upon the focus group discussions and data findings, the theoretical formulation of a conceptual model of FM business performance measurement model has been revised. This workshop generated different views that helped to produce a modified performance measurement model which in turn require further investigation through the use of quantitative research techniques. Therefore, the findings of the focus group workshop informed the design of a sector wide questionnaire survey.

Chapter 7- SURVEY QUESTIONNAIRE

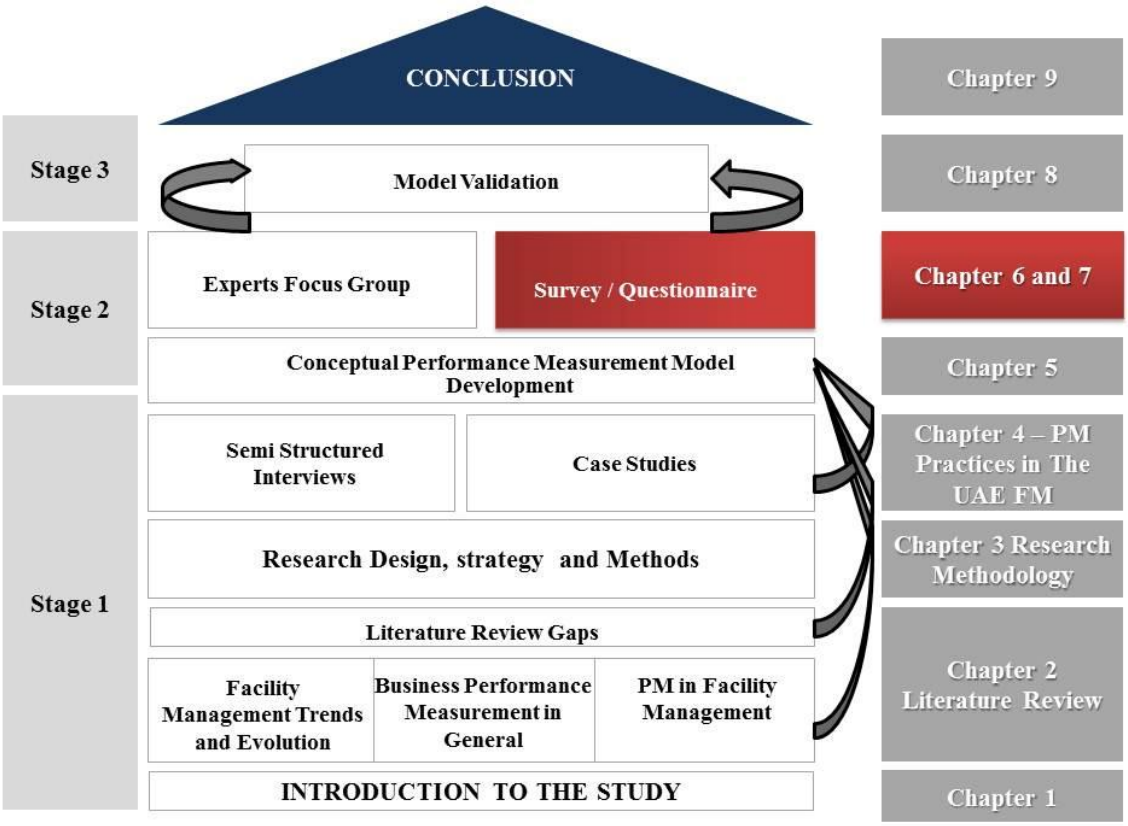


Figure 39 Research Structure - Chapter 7 Survey Questionnaire

7.1 Introduction

In the previous chapters, the conceptual performance measurement model was established from literature and case studies, which were further, refined using a focus group workshop. As displayed in the section 3.5.4 in the research methodology chapter, using focus groups has been traditionally dealt with by researchers as an initial step that needs verification by other research methods such as survey questionnaires (Morgan, 1997).

This chapter used the focus group findings to design a survey questionnaire to capture the opinions of FM experts about the proposed performance measures, the results were analysed and formed the main quantitative contribution of the research to support the qualitative findings in order to ultimately verify the performance measurement model.

The data gathered from questionnaire survey were statistically analysed using SPSS software to establish the structure of the measurement model and uncover the

performance dimensions in each perspective and compare it with the result of focus group workshop outcomes.

7.2 Basis of using experts' opinion within measurement model development process

The objective of this chapter was to get the opinions of experts on the relevance of suggested measures and run factor analysis to examine and validate the structure of the proposed model. So experts' opinions were considered as indicators (measures) to assess the level to which each proposed performance measure is consistent with the purpose of measuring performance of organisations in the facilities management. The same data collection and analysis methods have been followed in a number of scale development studies. Examples of these studies are listed in table 63 and summarized below:

1. This approach is supported by the flagship review paper published by Hinkin (1995) reviewing scales that have been developed in organisation management field based on assessment of "attitudes, perceptions, or opinions of organisational members in order to examine a priori hypothesized relationships with other constructs or behaviours." (Hinkin, 1995, p967). He reviewed scale development procedures for 277 measures used in 75 articles published in leading academic journals. The sample of reviewed papers included (number of studies in parentheses) Journal of Applied Psychology (25), Organisational Behaviour and Human Decision Processes (5), Human Relations (10), Journal of Management (12), Academy of Management Journal(15) and Personnel Psychology (8). Hinkin (1995) shows that an opinion based survey (with Likert scale) is widely used in social sciences research and that factor analysis is the most commonly used analytic technique for data reduction and refining constructs in the reviewed studies.

2. Similarly and in a subsequent guidance paper, Hinkin et al. (1997) outlined systematic seven-step process to assist researchers in developing usable scales. Step 3 of this process suggested developing questionnaire using Likert scale where participants supposed to give their opinion on each measure, and step 4 is to conduct exploratory factor analysis(principal axis factoring was recommended) and confirmatory factor analysis. This paper provided the illustrative example of Multi-

factor Leadership scale development where the approach of seeking managers' opinions has been adopted.

3. Moreover, Carpenter (2018) published a research that recommended 10 steps to follow in the scale development process. The first step suggested developing questionnaire to collected opinions of the subject matter professionals. Then the fifth step the researcher proposed to conduct common factor analysis and highlighted that the exploratory factor analysis (EFA) is the most often applied approach in evaluating proposed scales.

   Carpenter (2018) based her study on a quantitative content analysis of 68 leading communication journals which were selected for the purpose of describing the current state of scale development practices in the communication field.

4. In facilities management field, Koleoso et al. (2017) developed a multi-item scale of 41 measures which could be used in the assessment and management of performance of facilities management services. They used a survey where respondents were asked to rate the measures according to their perceived importance as measures of FM performance on a Likert scale of 1-5. The obtained data were analysed using factor analysis to identify underlying 5 dimensions (factors) in the developed scale that facilities managers must focus on to enhance their services performance.

5. In project management area of study and to identify the determinants for effective performance of Project Management Consultants (PMCs) in Malaysia, Nitithamyong and Tan (2007) conducted a survey to elicit perceptions of construction practitioners followed by factor analysis to formulate and validate their evaluation model.

6. In supply chain management domain, Gawankar et al. (2016) developed a multi-dimensional scale of nine dimensions which helps to determine appropriate supply chain performance measurement (SCPM).The field study was carried on a sample of 213 operations and supply chain practitioners working with organized retail stores in India, who filled the survey forms to give their opinions on the proposed measures based on seven-point Likert interval scale. Then an exploratory factor analysis and

the confirmatory factor analysis were used to test the validity of the proposed measurement scale.

7. In the field of marketing management, Papadas et al. (2017) adopted four stages scale development process. A survey was conducted to collect the opinion of 103 managers who evaluated the proposed items (measures) based on a 7-point Likert scale. Next, EFA analysis using rotation was performed to reduce the number of items and test the underlying dimensions of the construct.

8. Hemsworth (2016) conducted an empirical assessment of the EFQM model in purchasing. He used a survey instrument to measure 23 items, respondents were asked to indicate their degree of agreement or disagreement with the listed measures using five-point Likert scales. Using the survey data, confirmatory factor analysis (CFA) was conducted to address the reliability and validity of the study's constructs.

9. In project management field¸ Albert (2001) extracted six project success factors by conducting factor analysis on 31 variables developed through a synthesis of empirical studies and project participants' opinions. The data was collected by a survey which asked the respondents to rate all project success measures according to a five-point Likert scale. Principal factors extraction with varimax rotation was performed.

10. Ajmal et al. (2017) examined the underlying dimensional structure of project management practices to identify key factors that underpin the successful completion of projects. The researchers employed exploratory factor analyses to investigate the interrelationships of the survey items synthesized from the literature.

11. In sustainable construction field where the understanding of important criteria of measurement is still ongoing, several studies have used experts' opinion survey and factor analysis to develop further understanding of sustainability measurement scales for specific areas such as sustainable materials (Akadari, 2011), sustainable on-site equipment (Waris et al. 2014) and sustainable project management (Martens and Carvalho 2016).

Table 63 Examples of studies similar data collection and analysis methods

Author(s)	Publication Title	Field of study	Study purpose
Hinkin (1995)	Review of Scale Development Practices in the Study of Organisations	Organisations management	To review scale development practices and procedures in organisation management field
Hinkin et al. (1997)	Scale Construction: Developing Reliable and Valid Measurement Instruments	Organisations management	To outline systematic process to assist researchers in developing measurement scales
Carpenter (2018)	Ten Steps in Scale Development and Reporting: A Guide for Researchers, Communication Methods and Measures,	Communication management	The goal is to highlight 10 major steps along the scale development decision tree to make the process more accessible and to encourage more systematic applications in future research.
Koleoso et al. (2017)	Performance measurement scale for facilities management service in Lagos-Nigeria	Facilities management	this research aims to identify contextual parameters for evaluating performance of FM service in office buildings in Lagos
Nitithamyong and Tan (2007)	Performance evaluation of external project management consultants in Malaysia	Construction management	To investigate the important roles of PMCs, the key factors contributing to their effective performance, and the appropriate measurement criteria for assessing performance.
Gawankar et al. (2016)	Development, measurement and validation of supply chain performance measurement (SCPM) scale in Indian retail sector	Supply chain management	To develop a scale with a high degree of reliability, validity and dimensionality which help to determine appropriate supply chain performance measurement (SCPM).
Papadas et al. (2017)	Green marketing orientation: Conceptualization, scale development and validation	Marketing management	This study introduces the construct of green marketing orientation, which comprises three dimensions scale
Hemsworth (2016)	An Empirical Assessment Of The EFQM Excellence Model In Purchasing	Quality management	To empirical assess the EFQM model in purchase
Albert (2001)	Design and Build Project Success Factor: Multivariate Analysis	Project Management	This study aimed to identify a set of project success factors for design and build (DandB) projects and examine the relative importance of these factors on project outcome.
Ajmal et al.(2017)	Factor analysing project management practices in the United Arab Emirates	Project Management	The purpose of this paper is to examine the underlying dimensional structure of project management practices to identify key factors that underpin the successful completion of projects.
Akadiri (2011)	Development of a multi-criteria approach for the selection of sustainable materials for building projects.	Sustainable construction	Selection model of sustainable materials for building projects
Waris et al. (2014)	Criteria for the selection of sustainable onsite construction equipment.	Sustainable construction	Selection model of sustainable onsite construction equipment
Martens and Carvalho (2016)	Key factors of sustainability in project management context : A survey exploring the project managers ' perspective	Sustainable construction	Factors of sustainability in project management context

7.3 Questionnaire design

Hayes (2000) stated that there are a number of stages to be adopted to produce a competent questionnaire. These stages are:

1. Identifying the objectives of the questionnaire
2. Questions design
3. Administering the questionnaire
4. Questionnaire results
5. Results analysis using factor analysis approach
6. Reporting the study

7.3.1 Questionnaire Objectives

The main objectives of this questionnaire were identified as listed below:

1. To explore the opinion of a wider number of professionals in the facilities management sector about the proposed conceptual model performance measures;
2. To establish the measurement model structure in accordance with the analysed data
3. To test the PM model developed by the previous exploratory focus group workshop
4. To use the outcomes in aggregating the different levels of performance perspectives, dimensions, and measures.

7.3.2 Questions Design and Scale Development

The use of questionnaires involves the preparation of definite and clear questions to target respondents whose knowledge and experiences are valuable to the study.

The questionnaire covers the performance measures of the two performance perspectives (drivers and results) proposed during the literature review, case studies and discussed during the focus group.

Moreover, it is important to highlight that the questionnaire was pilot tested with the researcher's colleagues in the FM field. The respondents in the pilot survey were asked to comment on the questions, the use of the Likert scale, and the length and the layout of the

questionnaire. Comments were gathered and helped in designing the final survey format as shown in Appendix E.

The questionnaire was made of three sections:

- **The first section** consists of general questions with regards to the profile of the participant.
- **The second section** assesses the level to which each proposed performance measure can be used in the facilities management industry to measure the performance of the organisation.
- **The third section** includes an open question for any further comments and recommendations

McCormack (1997) recognized three styles of questions that are: Behavioural, Attitudinal and Classification questions. The first is used to explore the way the participant's act, the second to explore the way participants think, the third to explore who the participants are. As discussed in the research methodology chapter, the questions styles used were attitudinal and classification questions.

Moreover, the current research adopted a 10-point scale, with 1 being strongly disagree and 10 being strongly agree, to collect data from the participants who were asked to indicate to what extent do they agree that each of the performance measures listed in the questionnaire can be used to measure FM organisation performance.

Data Coding

To make it easier when shown in tables and analysis and as per an advice taken when conducting the pilot survey, the questionnaire was designed where measures were all coded, Enablers were coded E1, E2, E3, etc.….and Results as R1, R2, R3, etc.

7.3.3 Administering the Questionnaire

During administering questionnaires, it is vital to use strategies that facilitate access to the targeted participants in order to increase the response rate. There were four ways identified by Easterby (2008) with regards to questionnaire administration, as below:

1. Postal/mailed questionnaire, the questionnaires mailed to the respondents accompanied by self-addressed envelopes
2. Structured interview, the interviewer is present while each participants answers are recorded
3. Web-based, respondents sent a link and asked to fill the questionnaire online
4. Face to face, where the questionnaires to be conducted face to face by the researcher.

This research used the e-mail method and the face-to-face administration. So the questionnaire was distributed by: e-mails followed up by calls, and distributed personally. These approaches gave a high response rate as shown in results sections.

Data collected were subjected to factor analysis (using SPSS 24). Sections below summarises the procedure involved in factor analysis.

7.3.4 Questionnaire Results and Analysis

In this study, 335 questionnaires were distributed in total. 205 were returned, 87 from FM professionals who are doing Masters in FM or IFMA-FMP (Facilities Manager Professional) training and 118 from FM professionals who responded to the questionnaire sent by e-mails, this gave a total response rate of 61.19%.

The data collection was subjected to factor analysis (using SPSS 24). Sections below summarises the procedures involved in factor analysis. Before the data analysis stage, the raw data were treated, coded, classified as data or missing data for those unanswered. Then, the data was ready for analysis;

Missing Data

It is very common for a questionnaire to be returned with unanswered questions, these questions were treated as missing data, and were assumed because the respondent didn't want to answer, didn't understand the questions, or missed that question. This type of data was dealt with by assigning a special coding number when entering the data into SPSS. This research used (-5) to express the missing data.

Missing values can cause problems that can be resolved by replacement or deletion (Hair et al. 1998). The most common replacement method is using the mean of the variable to

replace missing data (Hair et al. 1998). Accordingly, this was taken into consideration in SPSS and each missing value was substituted by the mean of the variable concerned, and the resulting data set was used in the statistical analyses.

7.3.5 Data Analysis Using Factor Analysis approach

The data collected were analysed using factor analysis, where individual attributes are grouped into a number of factors (Naumann and Giel, 1995). Kim and Mueller (1997) said that the variables that share common patterns of relationship with each others are loaded into a "factor", so the factor analysis is used to explore the interrelationships among variables in a group.

Factor analysis has two main applications expressed in the literature. The first is exploratory factor analysis, which is used to explore the collected data to examine the interrelationships among variables. The other is the *confirmatory* factor analysis that is used to validate a particular theory related to the interrelationships among variables (Pallant, 2005). In this research both factor analysis approaches were used, the first is used in this chapter and the second in the next chapter (Validation Chapter).

In this research, four main reasons for using factor analysis:

1. Factor analysis has the ability to explore the extent to which a group of variables are describing one underlying "factor" (Bryman and Cramer, 2008).
2. It can define the extent to which a case of many variables can be decreased and represented by fewer group of "factors" (Field, 2009).
3. Factor analysis can be used as a weighting technique (ESI, 2005).
4. It can be used to validate the model fitness

Based on this, factor analysis was used to analyse the quantitative data gathered from the survey to establish the structure of the measurement model and uncover the performance dimensions in each perspective, and then compared it with the results of focus group workshop (the qualitative data collection method).

7.3.6 Exploratory factor analysis process: the EFA

During the exploratory factor analysis process (EFA), the following steps were performed with the assistance of SPSS Statistics V.24:

Step one - The appropriateness of the factor model is evaluated.

Step two – Factor Extraction, determining the number of factors that represent the data. "Principal axis factoring" extraction method with Kaiser-Guttman rule and "scree plots" were used to recognize the number of factors and compare it with the results of Focus Group workshop,

Step three – The Factor rotation

7.3.6.1 The appropriateness of the Factor Model

The appropriateness of the factor model is evaluated. Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity were conducted to examine the sampling adequacy, ensuring that factor analysis was going to be appropriate for the research.

The data collected can be considered appropriate for factor analysis when KMO value is greater than 0.5 (Field, 2009). The other test is Bartlett's test of sphericity, Bartlett's measure tests the null hypothesis that the original correlation matrix is an identity matrix i.e., all diagonal elements are 1 and all off-diagonal elements are 0, implying that all of the variables are uncorrelated. For factor analysis to work we need some relationships between variables and if the coorrelation matrix were an identity matrix then all correlation coefficients would be zero (Field, 2009). Therefore, we want this test to be *significant* (i.e. have a significance value less than 0.05) (Pallant, 2005). A significant test tells us that the coorrelation matrix is not an identity matrix; therefore, there are some relationships between the variables we hope to include in the analysis.

7.3.6.2 Factor Extraction Technique

There are two main extraction methods commonly used, the "principal component method" and the "principal axis factoring" (also called "common factor analysis" or "principal factor analysis"). Choosing factor extraction method depends mainly on the research purpose; principal component method is often used for data reduction, while principal axis factoring is preferred when the purpose of the analysis is to detect structure. In other words, in factor analysis, it is assumed that an underlying causal model exists,

whereas principal component method is simply a variable reduction technique (Diane, 2009).

Based on this, and as per the research objective to detect the structure and model dimensions (factors), the principal axis factoring extraction method was used.

It was also; highlighted by (Gorsuch, 1989) that although the statistical procedures of "principal component method" and the "principal axis factoring" are different, many researchers agree that the outputs from both methods produce similar results in cases with a large number of variables (e.g., 30 or more)

- ***Number of Factors to Retain***

Brown (2006) said that there are two techniques that can be used to determine the number of factors to be retained.

a. The Kaiser-Guttman rule
b. The Scree test

a) The Kaiser-Guttman rule

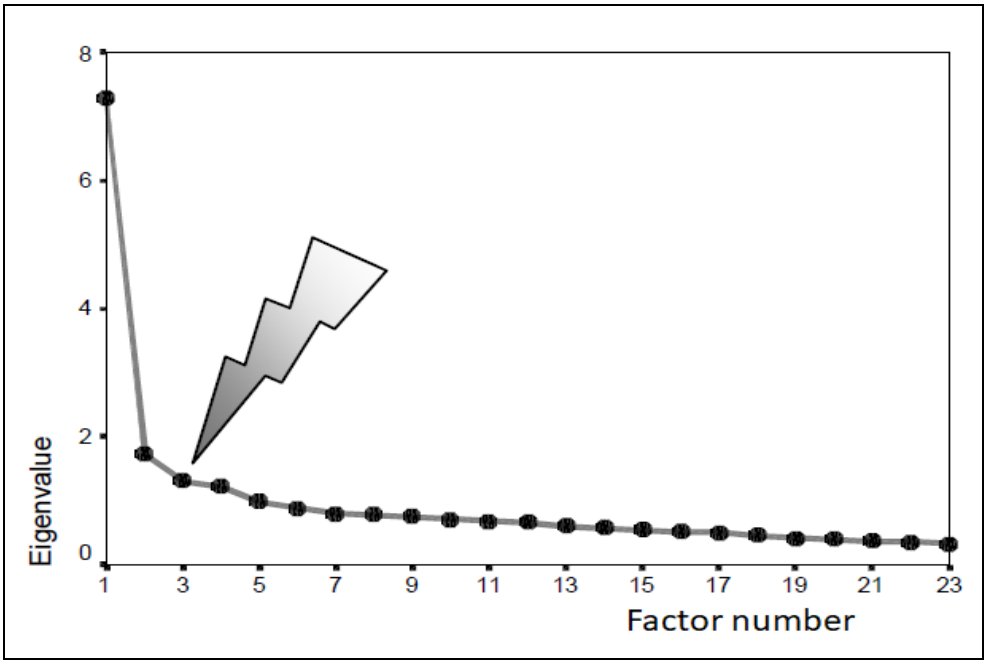
This rule suggests retaining the number of factors with eigenvalues greater than 1, suppressing all other factors with eigenvalues less than 1 based on Kaiser's criterion (Kim and Mueller, 1994; Field, 2000). This method is widely used in research as it ensures that only factors that have an eigenvalue greater than certain value are kept (Feild, 2009), and it is the default setting of many statistical packages (Ledesma and Valero-Mora, 2007).

It has been argued that Kaiser-Guttman rule may result in overestimation in the number of factors extracted (Costello and Osborne, 2005; Field, 2009); Pallant, (2005) criticised the rule as well because it often retains too many factors. Based on this the extracted number of factors should be reviewed, analysed and compared with literature, previous studies, and other data collection methods. In this study the extracted number of factors were compared with focus group outcome.

b) Scree Test

Moreover, the number of factors to retain can be supported by Cattell scree test which comprises a diagram that has two axes representing the factors and their corresponding eigenvalues (Field, 2009). This diagram has a curve with a significant drop followed by a flat line. The number of factors to keep is recognised by the cut-off point where the curve changes its shape (Field, 2009). Figure 40 shows a sample of scree plot, in this case 3 factors to be extracted.

Figure 40 Example of scree test that most likely have 3 underlying factors.



Source: Field (2005)

In this research, the factor analysis of FM performance measurement questionnaire resulted in an emergence of number of factors, that were compared with the model and its factors and measures distribution generated from the focus group workshop, and then decided how many factors to keep.

7.3.6.3 The Factor Rotation

The factor rotation was used to transform the initial matrix to a simpler and more theoretically meaningful one and making the factors more explanatory. Factor rotation is also use to interpret the relationship between the observed variables and the latent factors

in an easy way. Among the most commonly used rotation method, the varimax rotation is the one selected for this study.

Practically, rotations can be orthogonal or oblique. Using the orthogonal method, the extracted factors are rotated in a way that maintains their independence (Field, 2009). Three orthogonal rotation techniques are used in SPSS: varimax, equamax and quartimax (Field, 2009). Pallant (2005) stated that Varimax technique is mostly used in SPSS; it reduces the number of variables that hold high loadings on every factor.

Field (2009) added that the oblique rotation method is adopted when the correlation within the factors is justifiable. Where using this method, it permits the correlation within the underlying factors.

Pallant (2005) suggested that both methods can be performed and then the technique that presents the clearer and simpler result to interpret can be adopted.

7.4 Questionnaire results and analysis

The first section general questions about the profile of the respondents.

This section consists of general questions with regards to the profile of the participant, as shown in the below table 64, 87% of the participants have more than 3 years' experience and 82% are holding managerial positions, this shows that the participants have the relevant experience required for that survey and they supposed to have the needed knowledge to give their opinion on the topic discussed. Moreover, the organisations that the participants are working with are relatively big (50 % have more than 500 employees and only 6% with less than 50 employees), In addition to that and with respect to the UAE market which is still considered developing these organisation are relatively well established where 58 % are older than 7 years and only 11 % less than 3 years old.

Table 64 Participants General Information

Please state your job title:	Facilities Engineer	Facilities Manager	Mid Management	Senior Management
	37	73	61	34
	18%	36%	30%	17%

Years of Experience	1 to 3 years	3 to 7 years	7 to 10 years	more than 10 years
	27	69	62	47
	13%	34%	30%	23%

How long have you been in the organisation	Less than a year	1 to 5 years	More than 5 years
	16	122	67
	8%	60%	33%

Company Size (employees number):	0-50	50-500	above 500
	13	89	103
	6%	43%	50%

Age of organisation	1 to 3 years	3 to 7 years	7 to 10 years	more than 10 years
	22	64	74	45
	11%	31%	36%	22%

The second section assesses the extent to which each performance measure can be used in the facilities management industry.

Results of these sections were analysed using exploratory factor analysis (EFA); the steps discussed in the previous sections were followed to perform such analysis on two sets of data: performance enabler's measures and performance results measures.

7.4.1 Set One: Enablers

The enablers measures consist of 51 factors, these with the responses of the survey participants were inserted in the SPSS and then analysed as below:

7.4.1.1 The appropriateness with the Kaiser-Mayer-Olkin (KMO) and Baralett's Test

The results presented in table 65 indicate that Bartlett's test is highly significant ($p < 0.001$). Also, the value of KMO measure of sampling adequacy is 0.729, above the 0.5 threshold meaning that the sample size is suitable for the factor analysis.

Table 65 KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.729
Bartlett's Test of Sphericity	Approx. Chi-Square	12009.778
	df	1275
	Sig.	.000

Reliability Testing:

Reliability according to Easterby-Smith et al. (2008) is the extent to which the data collection and analytical techniques will yield consistent findings. Cronbach's coefficient was used to examine the internal consistency of the scales. Cronbach's Alpha is designed as a measure of internal consistency of items in the questionnaire. It varies between zero and one. The closer alpha is to one, the greater the internal consistency of the items in the questionnaire. Bohrnstedt and Knoke (1994) suggest that alphas of 0.70 or higher are acceptable, Pallant, (2004) and Chan (2005) also agreed on alpha values to be greater than 0.7 so it can then be regarded as sufficient. To demonstrate the reliability of scales table 66 indicates the scales for this study is 0.811 which is greater than 0.7 so it is reliable. Moreover, as mentioned above the total number of enablers questions in the survey is 51, then "N" of items in the below Cronbach's Alpha test is 51.

Table 66 Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N. of Items
.811	51

We have to check the reliability (Cronbach's Alpha) of each factor to check if it is reliable or not, this was shown at later stage, when indicating the extracted factors and their respective measures. Further details were enlarged in the next sections.

7.4.1.2 Factor Extraction Technique (FET)

To determine the number of factors necessary to represent the data given in the items and to ascertain how well the chosen factor model fits the data, the factor extraction techniques were applied. "Principal axis factoring" was used to identify the number of factors and compare it with the results of Focus Group workshop. As discussed in the

above sections, there are two main extraction methods widely used, Principle component method and principle axis factoring. The first is often used as a method for data reduction, while Principal Axis Factoring is preferred when the aim of the analysis is to detect structure. For this reason, Principal Axis Factoring was used as extraction method in the SPSS. Also, it is important to mention that extracted number of factors is affected by other rules, the main one is the theory and previous studies, so the first trial was conducted to check how many factors can be extracted when Eigen value is greater than 1 and their allocation which were subsequently compared to the model and its factors and measures distribution generated from the focus group workshop, and then decided how many factors to keep.

a. **Kaiser-Gutman Rule**

The results presented in table 67 shows that 11 factors having eigenvalue greater than 1 were extracted and suppressing all other factors with eigenvalues less than 1 as per Kaiser-Gutman Rule, these factors account for more than 76 % of the variation in the data whereas the rest of the factors account for smaller amount of the variance. In the below table, total column provides the Eigen values. The first factor accounted for the maximum variance and the next factor accounted for lesser variance compared to the first factor as observed and so on. Hence each successive factor accounted for lesser and lesser variance.

Table 67 Factor Extraction Results

Total Variance Explained									
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.795	13.323	13.323	6.574	12.891	12.891	4.672	9.161	9.161
2	6.201	12.158	25.482	5.914	11.597	24.488	4.090	8.020	17.182
3	5.601	10.982	36.463	5.350	10.490	34.978	3.925	7.696	24.878
4	4.876	9.561	46.025	4.617	9.053	44.031	3.757	7.366	32.244
5	4.206	8.248	54.273	3.928	7.701	51.733	3.677	7.209	39.453
6	3.013	5.907	60.180	2.778	5.446	57.179	3.383	6.634	46.087
7	2.182	4.279	64.459	1.914	3.752	60.932	2.977	5.837	51.924
8	1.830	3.588	68.047	1.610	3.158	64.089	2.785	5.460	57.384
9	1.677	3.289	71.337	1.343	2.634	66.723	2.695	5.283	62.667
10	1.488	2.917	74.254	1.314	2.577	69.300	2.450	4.804	67.471
11	1.172	2.297	76.551	0.908	1.780	71.080	1.841	3.609	71.080
12	0.958	1.878	78.429						
13	0.953	1.869	80.298						
14	0.862	1.691	81.989						
15	0.763	1.496	83.485						
16	0.753	1.477	84.961						
17	0.641	1.258	86.219						
18	0.600	1.176	87.395						
19	0.569	1.116	88.511						
20	0.531	1.041	89.552						
21	0.503	0.986	90.538						
22	0.449	0.880	91.418						
23	0.443	0.868	92.286						
24	0.412	0.809	93.094						
25	0.369	0.723	93.817						
26	0.359	0.704	94.521						
27	0.352	0.689	95.211						
28	0.287	0.562	95.773						
29	0.278	0.545	96.317						
30	0.259	0.508	96.825						
31	0.207	0.406	97.231						
32	0.171	0.334	97.566						
33	0.155	0.305	97.871						
34	0.141	0.277	98.148						
35	0.127	0.250	98.398						
36	0.124	0.243	98.641						
37	0.105	0.206	98.847						
38	0.080	0.156	99.003						
39	0.076	0.150	99.153						
40	0.071	0.139	99.292						

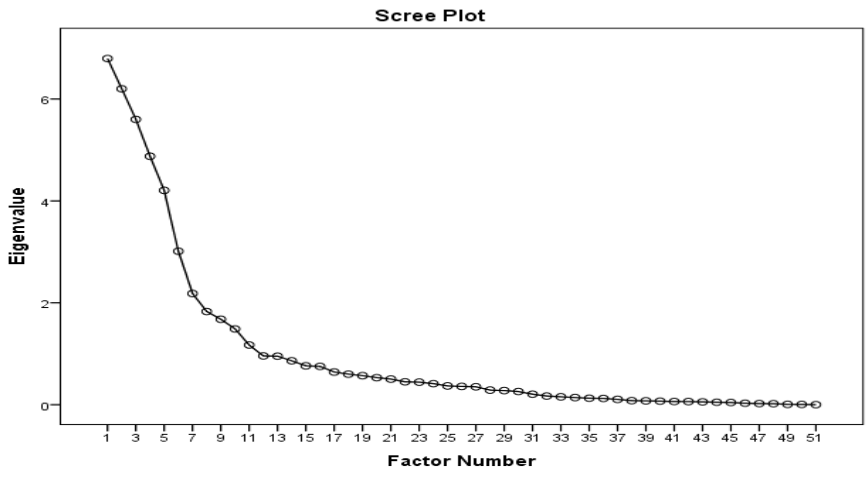
41	0.063	0.123	99.415						
42	0.062	0.122	99.537						
43	0.056	0.111	99.648						
44	0.049	0.095	99.743						
45	0.044	0.086	99.829						
46	0.029	0.057	99.886						
47	0.023	0.045	99.931						
48	0.020	0.040	99.971						
49	0.007	0.015	99.985						
50	0.006	0.011	99.996						
51	0.002	0.004	100.000						
Extraction Method: Principal Axis Factoring.									

However, the focus group generated only 9 dimensions, so the comparison were executed in the next sections to show the differences among dimensions and their components within the two approaches (EFA and Focus Group) and the possibility to integrate and combine the factors and their measures .

b. Scree Plot

Figure 41 shows the scree plot produced for the data of the performance results measures. The cut-off point is not easy to recognize, as there are many factors near to each other's at the point of horizontal line. The cut-off point is defined by the point at which the curve becomes more of a horizontal shape. Since it hard to be identified, the researcher opted for the results of focus group after comparing them with Kaiser-Gutman rule of extraction.

Figure 41 Scree Plot



7.4.1.3 Factor Rotation

To decide which rotation method to use, Pallant (2005) suggested that both methods can be performed and then the technique that presents the clearer and simpler result to interpret can be adopted. The first trial was by choosing the oblique rotation with the Direct Oblimin Method, the correlation matrix below (see table 68) shows very low correlation and non-reached 0.45 and with most of them near to zero, so they were orthogonally related which implies the use of Varimax Rotation as the rotation method is recommended.

Table 68 Factor Correlation Matrix- with Direct Oblimin Rotation

Factor Correlation Matrix											
Factor	1	2	3	4	5	6	7	8	9	10	11
1	1.000	.266	.010	-.032	-.029	-.022	.226	.317	-.038	.177	.067
2	.266	1.000	-.038	-.020	.094	.024	.372	-.089	.082	-.066	-.057
3	.010	-.038	1.000	-.044	-.002	.197	.023	.099	.035	-.001	-.307
4	-.032	-.020	-.044	1.000	-.034	-.056	.087	.000	.024	.110	.021
5	-.029	.094	-.002	-.034	1.000	.024	-.037	-.160	.446	-.005	-.075
6	-.022	.024	.197	-.056	.024	1.000	-.037	-.017	-.019	-.027	-.214
7	.226	.372	.023	.087	-.037	-.037	1.000	-.043	.074	-.024	.187
8	.317	-.089	.099	.000	-.160	-.017	-.043	1.000	-.080	.257	.048
9	-.038	.082	.035	.024	.446	-.019	.074	-.080	1.000	-.007	-.078
10	.177	-.066	-.001	.110	-.005	-.027	-.024	.257	-.007	1.000	.036
11	.067	-.057	-.307	.021	-.075	-.214	.187	.048	-.078	.036	1.000

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.

Based on the above results, the analysis was rebuilt by choosing the orthogonal Varimax rotation method. Table 69 shows the results generated with Varimax rotation.

Table 69 Rotated Factor Matrix

Rotated Factor Matrix[a]											
	Factor										
	1	2	3	4	5	6	7	8	9	10	11
E16	0.952										
E18	0.866										
E13	0.846										
E15	0.826										
E17	0.799										
E14	0.675										
E12	0.668										0.495
E9		0.896									
E8		0.832									
E10		0.825									
E6		0.774									
E7		0.755									
E11		0.700									
E1			0.895								
E2			0.863								
E4			0.861								
E5			0.755								
E3			0.750								
E33				0.921							
E35				0.855							
E37				0.757							
E32				0.692							
E36				0.621							
E34				0.471							
E40					0.966						
E39					0.845						
E41					0.822						
E42					0.715						
E38					0.565						
E30						0.920					
E28						0.918					
E27						0.828					
E26						0.633					
E19							0.901				
E21							0.889				
E23							0.884				
E49								0.919			
E51								0.857			
E50								0.826			
E46									0.705		
E48									0.673		
E47									0.618		
E45									0.603		
E44									0.538		
E43									0.520		
E22										0.765	
E24										0.684	
E25										0.627	
E20										0.603	
E31						0.482					0.862
E29											0.805

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Once analysis was done, the comparison was executed to show the differences among dimensions and their components within the two approaches (EFA and Focus Group), and the possibility to integrate and combine the factors and their measures, the differences were summarized below:

Number of dimensions generated: During the focus group workshop, the participants agreed to have only 9 dimensions, where the EFA shows the extraction of 11 factors/dimensions:

Looking closely to Factor 6 measures which includes: Facilities management culture, Team satisfaction, Employees Recognition and Roles and responsibilities, and Factor 11 measures which includes: Competence of staff and staff commitment. These two sets of measures (F6 and F11) are related to each other and therefore there is a possibility to combine them together to form the "Human Resources" dimension, this shows an agreement with the focus group results where the Human Resources contains these measures with addition to two measures Planning and Scheduling and Staff training and development. See the below tables (table 70 and table 71)

Table 70 Human Resources Dimension -Focus Group Outcome

	Human Resources
E25	Planning and Scheduling
E26	Roles and responsibilities are clearly defined
E27	Employees Recognition
E28	Team satisfaction
E29	Staff commitment
E30	Facilities management culture
E31	Competence of staff
E32	Staff training and development

Table 71 F6 and F11 –EFA outcome

F6	E26	Roles and responsibilities are clearly defined	0.633
	E27	Employees Recognition	0.828
	E28	Team satisfaction	0.918
	E30	Facilities management culture	0.920
F11	E29	Staff commitment	0.805
	E31	Competence of staff	0.862

Similarly, factor 7 which have: Service Delivery Performance, Resource utilisation and Help Desk/Call centre Performance can be combined with Factor 10 measures: Achievement of completion deadlines, Workforce and Teamwork Management, Planning and Scheduling and Service reliability, these two sets of measures (F7 and F10) are related to each other and therefore there is a possibility to combine them together to form the "Productivity" dimension, this shows a an agreement with the focus group results where the "Productivity" includes these same measures without measure E25 Planning and Scheduling. See the below tables (table 72 and table 73)

Table 72 Productivity Dimension -Focus Group Outcome

4	**Productivity**
E19	Service Delivery Performance
E20	Service reliability
E21	Resource utilisation
E22	Achievement of completion deadlines
E23	Help Desk/Call centre Performance
E24	Workforce and Teamwork Management

Table 73 F7 and F10 –EFA outcome

F7	E19	Service Delivery Performance	0.901
	E21	Resource utilisation	0.889
	E23	Help Desk/Call centre Performance	0.884

F10	E20	Service reliability	0.603
	E22	Achievement of completion deadlines	0.765
	E24	Workforce and Teamwork Management	0.684
	E25	Planning and Scheduling	0.627

In addition to the difference in the number of the dimensions between the focus group and the exploratory factor analysis (EFA), it was noticed also that there slight differences in the allocations of some measures within extracted factors/Dimensions. As shown above E25 "Planning and Scheduling" appears within the "Productivity" dimension and E32 Staff training and development appears within F4 "Learning and Growth" group of measures, where when conducting the focus group both of the measures were in "Human Resources" dimension. Also E19 "Resource utilisation" appears within the "Productivity" dimension, where when conducting the focus group it was in "Processes and

Procedures" dimension. Based on this it is clear that there are 3 main dimensions where combination and differences appear, they are: Human Resources, Productivity and Learning and Growth.

Table 74, shows the name of each factor and the combinations of the factors of F7 and F10, and F6 and F11.

Table 74 Enablers Factors Distribution

Leadership	F3
Policy and Strategy	F2
Processes and Procedures	F1
Productivity/Service Quality	F7 and F10
Human Resources	F6 and F11
Learning and Growth	F4
Partnership and Resources	F5
Health , safety and Environment(HSE)	F8
Technology	F9

Second Trial -with 9 Factors extracted

Based on above analysis and the possibility to combine (F7 and F10) and (F6 and F11) factors and as per the Focus group outcomes, it was decided to do the extraction and rotation for the second time with a fixed number of factors to be extracted (9 factors). So the number of factors was defined in SPSS and all other options kept the same. The below outcomes were generated:

As shown in table 75, factors account for more than 71% of the variation, entailing a strong model. And the rotation shown in table 76, the measures of F7 and F10, and F6 and F11 were loaded together, which confirm the previous suggestion.

Table 75 Total Variance Explained

Total Variance Explained									
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.795	13.323	13.323	6.526	12.797	12.797	4.663	9.143	9.143
2	6.201	12.158	25.482	5.882	11.534	24.330	4.140	8.118	17.261
3	5.601	10.982	36.463	5.291	10.374	34.704	4.016	7.875	25.136
4	4.876	9.561	46.025	4.579	8.978	43.682	4.012	7.868	33.004
5	4.206	8.248	54.273	3.865	7.578	51.260	3.873	7.593	40.597
6	3.013	5.907	60.180	2.732	5.356	56.616	3.640	7.136	47.734
7	2.182	4.279	64.459	1.856	3.639	60.255	3.595	7.049	54.783
8	1.830	3.588	68.047	1.539	3.018	63.273	2.875	5.638	60.420
9	1.677	3.289	71.337	1.321	2.591	65.864	2.776	5.443	65.864
10	1.488	2.917	74.254						
11	1.172	2.297	76.551						
12	0.958	1.878	78.429						
13	0.953	1.869	80.298						
14	0.862	1.691	81.989						
15	0.763	1.496	83.485						
16	0.753	1.477	84.961						
17	0.641	1.258	86.219						
18	0.600	1.176	87.395						
19	0.569	1.116	88.511						
20	0.531	1.041	89.552						
21	0.503	0.986	90.538						
22	0.449	0.880	91.418						
23	0.443	0.868	92.286						
24	0.412	0.809	93.094						
25	0.369	0.723	93.817						
26	0.359	0.704	94.521						
27	0.352	0.689	95.211						
28	0.287	0.562	95.773						
29	0.278	0.545	96.317						
30	0.259	0.508	96.825						
31	0.207	0.406	97.231						
32	0.171	0.334	97.566						
33	0.155	0.305	97.871						
34	0.141	0.277	98.148						
35	0.127	0.250	98.398						
36	0.124	0.243	98.641						
37	0.105	0.206	98.847						
38	0.080	0.156	99.003						
39	0.076	0.150	99.153						
40	0.071	0.139	99.292						
41	0.063	0.123	99.415						
42	0.062	0.122	99.537						
43	0.056	0.111	99.648						
44	0.049	0.095	99.743						
45	0.044	0.086	99.829						
46	0.029	0.057	99.886						
47	0.023	0.045	99.931						
48	0.020	0.040	99.971						
49	0.007	0.015	99.985						
50	0.006	0.011	99.996						
51	0.002	0.004	100.000						
Extraction Method: Principal Axis Factoring.									

As explained above, the Varimax (orthogonal) rotation was used. This technique rotates the extracted factors in a way that makes the loadings of each performance driver's measure has a maximum value on no more than one of the 9 factors. The results of the rotated factor matrix are expressed in table 76. The table includes the performance enabler's measures and their corresponding loadings on each of the 9 factors. It is important to note that loadings that are less than 0.4 were suppressed for easier interpretation purposes.

Table 76 Rotated Factor Matrix

Rotated Factor Matrix[a]									
	Factor								
	1	2	3	4	5	6	7	8	9
E16	0.952								
E18	0.866								
E13	0.831								
E15	0.830								
E17	0.802								
E12	0.672								
E14	0.668								
E21		0.868							
E19		0.849							
E23		0.820							
E22		0.705							
E25		0.697							
E20		0.630							
E24		0.542							
E27			0.911						
E28			0.840						
E30			0.837						
E26			0.733						
E31			0.714						
E29			0.528						
E9				0.898					
E8				0.826					
E10				0.821					
E6				0.766					
E7				0.744					
E11				0.701					
E33					0.891				
E35					0.822				
E37					0.766				
E32					0.733				
E36					0.604				
E34					0.485				
E1						0.883			
E2						0.850			
E4						0.846			
E5						0.727			
E3						0.720			
E40							0.956		
E39							0.835		
E41							0.820		
E42							0.696		
E38							0.556		
E49								0.820	
E50								0.808	
E51								0.785	
E46									0.728
E48									0.695
E47									0.604
E43									0.554
E45									0.553
E44									0.507
Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.									
a. Rotation converged in 7 iterations.									

Base on this the allocation of the measures was shown in table 77 below:

Table 77 Criteria and Measures

Leadership	F6
Policy and Strategy	F4
Processes and Procedures	F1
Productivity	F2
Human Resources	F3
Learning and Growth	F5
Partnership and Resources	F7
Health, Safety and Environment(HSE)	F9
Technology	F8

F1	E16	Appropriateness and suitability of standards	F5	E33	New Service introduction
	E18	Assets maintenance Management		E35	Marketing Management
	E13	Risk Management		E37	Benchmarking
	E15	Effective Internal communication		E32	Staff training and development
	E17	Mobilization		E36	Innovation
	E12	Inventory performance		E34	Business Continuity
	E14	Standards Necessary revised on a regular basis	F6	E1	Leaders develop the mission, vision and values
F2	E21	Service Delivery Performance		E2	Effective implementation of changes
	E19	Resource utilisation		E4	Leaders engage with external stakeholders.
	E23	Help Desk/Call centre Performance		E5	Excellence Culture Reinforcement by Leaders
	E22	Achievement of completion deadlines		E3	Leaders Performance Management
	E25	Planning and Scheduling	F7	E40	Contract management
	E20	Service reliability		E39	Customer relationships Management
	E24	Workforce and Teamwork Management		E41	Client-service provider relationship
F3	E27	Employees Recognition		E42	Supply chain management
	E28	Team satisfaction		E38	Appropriateness and suitability of service levels
	E30	Facilities management culture	F8	E49	Technology Management
	E26	Roles and responsibilities are clearly defined		E50	Information and Knowledge Management
	E31	Competence of staff		E51	CAFM usage
	E29	Staff commitment	F9	E46	Environmental Sustainability Management
F4	E9	Strategy is developed, reviewed and updated		E48	Health and Safety
	E8	Strategy is based on understanding the stakeholders needs		E47	Waste management
	E10	Strategy is communicated, implemented and monitored.		E43	Indoor Environment Quality
	E6	Adherence to policies		E45	Periodic HandS audit
	E7	Appropriateness of policies		E44	Statuary Compliance
	E11	Policies Necessary revised on a regular basis			

F1: Processes and Procedures consists of : Appropriateness and suitability of standards, Assets maintenance Management, Risk Management, Effective Internal communication, Mobilization, Inventory performance and Standards Necessary revised on a regular basis. "Appropriateness and suitability of standards" is a component of Processes and Procedures, because if the standards and procedures put in place are not suitable then this will have negative impact on other measures the whole factor. Assets maintenance Management and Mobilization are considered new in the PM model and specified to facilities management industry.

F2: Productivity/Service Quality consists of: Resource utilization, Service Delivery Performance, Help Desk/Call centre Performance, Achievement of completion deadlines, Planning and Scheduling, Service reliability and Workforce and Teamwork Management. Resource utilization, Workforce management and Service Delivery Performance have considered as without best utilisation of resources and good service performance the organisation cannot achieve the aimed service quality .These factors can be measured by Call centre input and data analysis, so the performance of the helpdesk within facilities management organisation is considered so important along with the proper Planning and Scheduling that can be part of the planning team working within the same software of help desk team and both coordinates with each other's.

F3: Human Resources consists of Employees Recognition, Team satisfaction, Facilities management culture, Roles and responsibilities are clearly defined, Competence of staff and Staff commitment. The first three measures shows the importance of the employees' recognition and satisfaction and culture they are working in, these measures are considered very vital in composing the human resources factor. Moreover, roles and responsibilities of the staff should be clearly defined, and staff competence and commitment should be measured all these are considered part of Human Resources role and should be measured accordingly.

F4: Policy and Strategy consists of Strategy is developed, reviewed and updated ,Strategy is based on understanding the stakeholders needs, Strategy is communicated, implemented and monitored, Adherence to policies, Appropriateness of policies and Policies Necessary revised on a regular basis. Strategy is developed, reviewed and updated and should be based on understanding the stakeholders needs. Moreover, it should be communicated, implemented and monitored and revised along with policies on a regular basis.

F5: Learning and Growth consists of Staff training and development, Marketing Management, Benchmarking, New Service introduction, Innovation and Business

Continuity. This factor consist of two main aspects development through internal staff and the development of the business itself compared with internal and external benchmarks ,and through introducing new business and innovation within new ideas and improving existing business by continuous improvement.

F6: Leadership consists of Leaders develop the mission, vision and values, Effective implementation of changes, Leaders engage with external stakeholders, Excellence Culture Reinforcement by Leaders and Leaders Performance Management. The development of vision and mission is considered as the main role of the leadership, then both "Effective implementation of changes and "Leaders engage with external stakeholders" this shows the vital role of leaders in change management and the importance of their engagement with external stakeholders.

F7: Partnership and Resources consists of Contract management, Customer relationships Management, Client-service provider relationship, Supply chain management and Appropriateness and suitability of service levels. This shows the importance of managing contracts with defined and appropriate service levels and terms and conditions, it is obvious that without proper contracts management partnerships cannot be maintained.

F8: Technology consists of: Technology Management, Information and Knowledge Management and CAFM usage. These three measures of technology factors are so important in facilities management. The usage of Computer Aided Facilities Management software (CAFM) is considered the core of any FM company where all Data related to Assets and tasks should be uploaded and the information and knowledge must be linked to this software using the best suitable technology.

F9: Health, safety and Environment (HSE) consists of Environmental Sustainability Management, Health and Safety, Waste Management, Indoor Environment Quality, Periodic Health and Safety audit and Statuary Compliance. Environmental Sustainability Management and Health and Safety are considered the main two measures of this factor, then the rest of measures which can be part of these two main measures, whoever they were taken into consideration separately for their importance.

7.4.1.4 Reliability test for each factor:

The Reliability analysis for each factor were done the below table (table 78) summarize the Cronbach's Alpha value of each factor, the results show that all the Cronbach's Alpha values are greater than 0.7, this means that all factors are highly reliable.

Table 78 Reliability Statistics

	Reliability Statistics	
	Cronbach's Alpha	N of Items
F1	0.917	7
F2	0.893	7
F3	0.900	6
F4	0.908	6
F5	0.849	6
F6	0.837	5
F7	0.908	5
F8	0.862	3
F9	0.813	6

7.4.1.5 Weighting

Aggregating Performance Enablers

To aggregate a set of performance measures that belong to one performance dimension using the simple additive weighting method, weightings of these measures were calculated. Yong and Pearce (2013) stated that a factor loading for a variable is a measure of how much the variable contributes to the factor, so the factor loading within the dimension reflects the importance of this variable. The Varimax rotated factor loading matrix (ESI, 2005) was used. As shown in table 79, the factor loadings of each measure that belongs to each of the performance dimensions were squared to eliminate the negative weighting possibility (Column A). The squared values were then summed up together within the same factor (Column B). The weighting of each measure was then calculated by dividing each variable's squared loading by the summation of squared values (Column C) (ESI, 2005).

Weight of each measure within respective factor = Squared factor loading/ Sum of squared factor loading.

Ci= Ai/Bj …… Ci = weightage of each measure within respective factor

Ai = Squared factor loading, Bj = Sum of squared factor loading, Bj =∑Ai

Aggregating the Performance Dimensions

Nadimi and Shakouri (2011) suggested that the variance of the factor reflects the importance of this factor, which is equal to the sum of the squared factor loadings (Child, 2006). Based on this, the squared factor loadings of every variable on each factor were summed up (X□). Then all the outcomes were added to form Y, at the end the weighting

of each factor (dimension) were calculated by dividing the summed squared factor loading by the total value.

Z□= (X□/Y) ….. Z□ = the weighting of each factor (dimension)

X□= Sum of squared factor loadings within the same factor (dimension)

Y = Summation of all squared factor loadings; Y =∑X□

Table 79 Weighting Calculations-Enablers

Factor Loading										**A**	**B**	**C**
	Factors									**Squared Loading**	**Sum of Squared Loading**	**Weight**
	1	2	3	4	5	6	7	8	9			
E16	0.952									0.906		20%
E18	0.866									0.750		16%
E13	0.831									0.690		15%
E15	0.830									0.688	4.66	15%
E17	0.802									0.643		14%
E12	0.672									0.452		10%
E14	0.668									0.446		10%
E21		0.868								0.754		20%
E19		0.849								0.720		19%
E23		0.820								0.673		18%
E22		0.705								0.497	3.819	13%
E25		0.697								0.485		13%
E20		0.630								0.397		10%
E24		0.542								0.294		8%
E27			0.911							0.830		23%
E28			0.840							0.705		20%
E30			0.837							0.701		20%
E26			0.733							0.537	3.561	15%
E31			0.714							0.510		14%
E29			0.528							0.278		8%
E9				0.898						0.806		21%
E8				0.826						0.683		18%
E10				0.821						0.673		18%
E6				0.766						0.586	3.793	15%
E7				0.744						0.553		15%
E11				0.701						0.492		13%
E33					0.891					0.795		25%
E35					0.822					0.676		21%
E37					0.766					0.586		18%
E32					0.733					0.537	3.193	17%
E36					0.604					0.364		11%
E34					0.485					0.235		7%
E1						0.883				0.780		24%
E2						0.850				0.723		22%
E4						0.846				0.716	3.266	22%
E5						0.727				0.529		16%
E3						0.720				0.519		16%
E40							0.956			0.914		30%
E39							0.835			0.697		23%
E41							0.820			0.672	3.077	22%
E42							0.696			0.484		16%
E38							0.556			0.310		10%
E49								0.820		0.672		35%
E50								0.808		0.653	1.942	34%
E51								0.785		0.616		32%
E46									0.728	0.530		24%
E48									0.695	0.483		22%
E47									0.604	0.365	2.247	16%
E43									0.554	0.307		14%
E45									0.553	0.305		14%
E44									0.507	0.257		11%
X	4.576	3.819	3.561	3.561	3.193	3.266	3.077	1.942	2.247	29.475	29.475	
Z	16%	13%	12%	12%	11%	11%	10%	7%	8%			

F1= 20%*E16+16%*E18+15%*E13+15%*E15+14%*E17+10%*E12+10%*E14

F2= 20%*E21+19%*E19+18%*E23+13%*E22+13%*E25+10%*E20+8%*E24

F3= 23%*E27+20%*E28+20%*E30+15%*E26+14%*E31+8%*E29

F4= 21%*E9+18%*E8+18%*E10+15%*E6+15%*E7+13%*E11

F5= 25%*E33+21%*E35+18%*E37+17%*E32+11%*E36+7%*E34

F6= 24%*E1+22%*E2+22%*E4+16%*E5+16%*E3

F7= 30%*E40+23%*E39+22%*E41+16%*E42+10%*E38

F8= 35%*E49+34%*E50+32%*E51

F9= 24%*E46+22%*E48+16%*E47+14%*E43+14%*E45+11%*E44

Enablers=16%*F1+13%*F2+12%*F3+12%*F4+11%*F5+11%*F6+10%*F7+7%*F8+ 8%*F9

F1: Processes and Procedures = 26%*Appropriateness and suitability of standards+16%*Assets maintenance Management+15%*Risk Management+15%*Effective Internal communication+14%*Mobilization+10%*Inventory performance+10%*Standards Necessary revised on a regular basis.

This shows that the highest weightage goes to "Appropriateness and suitability of standards" measure which logical, because if the standards and procedures put in place are not suitable then this will have negative impact on the whole factor.

F2: Productivity/Service Quality = 20%*Resource utilization+19%*Service Delivery Performance+18%*Help Desk/Call centre Performance+13%*Achievement of completion deadlines+13%*Planning and Schedualing+10%*Service reliability+8%*Workforce and Teamwork Management Resource utilization and Service Delivery Performance have the highest with weightage and both together give 39 % weightage as without best utilisation of resources and good service performance the organisation cannot achieve the aimed service quality

F3: Human Resources = 23%*Employees Recoginsion+20%*Team satisfaction+20%*Facilities management culture +15%*Roles and responsibilities are clearly defined+14%*Competence of staff+8%*Staff commitment

The first three measures are with highest weightage with accumulative score of 63% this shows the importance of the employees' recognition and satisfaction and culture they are working in .these measures are considered very vital in composing the human resources factor.

F4: Policy and Strategy = 21%*Strategy is developed, reviewed and updated +18%*Strategy is based on understanding the stakeholders needs +18%*Strategy is communicated, implemented and monitored+15%*Adherence to policies + 15%*Appropriateness of policies+13%*Policies Necessary revised on a regular basis.

F5: Learning and Growth = 25%*Staff training and development+21%*Marketing Management+18%*Benchmarking+17%*New Service introduction+11%*Innovation+7%*Business Continuity

This factor consist of two main aspects development through internal staff which has the highest score of 25 % and the development of the business itself compared with internal and external benchmarks.

F6: Leadership = 24%*Leaders develop the mission, vision and values+22%*Effective implementation of changes+22%*Leaders engage with external stakeholders+16%*Excellence Culture Reinforcement by Leaders+16%*Leaders Performance Management. The development of vision and mission has the highest score with 24 % as it is considered as the main role of the leadership, then both "Effective implementation of changes and "Leaders engage with external stakeholders" with equal weightage of 22%, this shows the vital role of leaders in change management and the importance of their engagement with external stakeholders.

F7: Partnership and Resources = 30%*Contract management+23%*Customer relationships Managememt+22%*Client-service provider relationship+16%*Supply chain magement+10%*Appropriateness and suitability of service levels Contract management has 30 % weightage which is the highest; this shows the importance of managing contracts with defined terms and conditions, it is obvious that without proper contracts management partnerships cannot be maintained.

F8: Technology = 34%*Technology Management+34%*Information and Knowledge Management +32%*CAFM usage. This shows that the three measures of technology factor have approximately equal weights, this means all of are with equal importance.

F9: Health, safety and Environment (HSE) = 24%*Environmental Sustainability Management+22%*Health and Safety +16%*Waste Management+14%*Indoor Environment Quality+14%*Periodic HandS audit+11%*Statuary Compliance

Environmental Sustainability Management and Health and Safety have the highest scores with 24% and 22% respectively, then the rest of measures which can be part of these two main measures, whoever they were taken into consideration separately for their importance.

Enablers=16%* **Processes and Procedures** +13%* **Productivity/Service Quality** +12%* **Human Resources** +12%* **Policy and Strategy** +11%* **Learning and Growth** +11%* **Leadership** +10%* **Partnership and Resources** +7%* **Technology** + 8%* **Health, safety and Environment (HSE)**

As shown, above Processes and Procedures factor has the largest weightage with 16 % , as it will have an impact on all other factors, then it followed by Productivity/Service Quality, Human Resources, Policy and Strategy, Learning and Growth, Leadership and Partnership and Resources with approximately equal weightages between 10 to 13 percentage and then Technology and Health, safety and Environment (HSE) with 7% and 8 % the last two factors have the lowest scores however it doesn't mean they are the least important, but due less work load and activities include within them compared with others factors and also they are effected with the success of other factors mainly the process and procedures.

7.4.2 Set two: Results

In this set, the results measures consist of 11 factors, these with the responses of the survey participants were inserted in the SPSS and then followed the same steps as the enablers and analysed as below:

1. **The appropriateness using Kaiser-Mayer-Olkin(KMO) and Barlett's Tests**

The results presented in table 80 indicate that Bartlett's test is highly significant ($p < 0.001$). Also, the value of KMO measure of sampling adequacy is 0.755, above the 0.5 threshold meaning that the sample size is suitable for the factor analysis.

Table 80 KMO and Barlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.755	
Bartlett's Test of Sphericity	Approx. Chi-Square	1478.581
	df	55
	Sig.	0.000

As for Enablers, the reliability tests for Results were conducted. All the values were above the 0.7 threshold table 81 indicating the scales for this study are reliable.

Table 81 Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
0.847	11

The reliability test (Cronbach's Alpha) was checked for each factor as well, this was shown at later stage, when indicating the extracted factors and their respective measures.

2. Factor Extraction

a) Kaiser-Gutman Rule

The results shows that 3 factors having eigenvalue greater than 1 were extracted as per Kaiser-Gutman Rule, These factors account for more than 73% of the variation in the data whereas the rest of the factors account for smaller amount of the variance.

Table 82 Total Variance Explained

Total Variance Explained									
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.007	36.431	36.431	3.646	33.149	33.149	2.972	27.014	27.014
2	2.419	21.995	58.426	2.223	20.211	53.361	2.642	24.021	51.035
3	1.704	15.490	73.915	1.510	13.728	67.088	1.766	16.054	67.088
4	0.839	7.627	81.543						
5	0.610	5.548	87.091						
6	0.423	3.850	90.941						
7	0.355	3.227	94.168						
8	0.278	2.529	96.697						
9	0.144	1.309	98.006						
10	0.134	1.220	99.226						
11	0.085	0.774	100.000						
Extraction Method: Principal Axis Factoring.									

b) Scree Plot

Figure 42 shows the scree plot for the performance results measures. The cut-off point, where the curve becomes horizontal is at factor number 4. Factors above this point to be retained. So, the number of factors retained was 3, this matches the result the Kaiser-Guttman rule shown in previous sections.

Figure 42 Scree Plots

As shown above, Kaiser-Gutman Rule and Scree Plot gave a result of 3 dimensions/Factors this matches the result of Focus group outcome. Below sections will show the distribution of the measures within these factors.

3. Factor Rotation

The Varimax (orthogonal) rotation was used. This technique rotates the extracted factors in a way that makes the loadings of each performance measure has a maximum value on no more than one of the 3 factors. The results of the rotated factor matrix are expressed in table 83. The table includes the performance results measures and their corresponding loadings on each of the 3 factors. It is important to note that loadings that are less than 0.4 were suppressed for easier interpretation purposes.

Table 83 Rotated Factor Matrix

Rotated Factor Matrix[a]			
	Factor		
	1	2	3
R6	0.799		
R5	0.760		
R7	0.746		
R4	0.643		
R3	0.623		
R8	0.561		
R9		0.944	
R11		0.936	
R10		0.878	
R1			0.924
R2			0.922
Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

Based on the above outcome the measures were distributed within their respective Factors and the table below were generated to show that the outcome of the EFA matches with Focus group workshop results.

Table 84 Results

Results(11)				
Financial Results	F1		Customer Satisfaction	F2
Profitability	R6		Customer Results Performance Indicators.	R9
Market share	R5		Reoccurring business	R11
Cash flow	R7		Corporate Social Responsibility	R10
Turnover rate	R4		Society/Community Results	F3
Value for money	R3		Society Results Performance Indicators.	R1
Revenue growth	R8		External Awards	R2

4. Reliability test for each factor :

The Reliability analysis for each factor were done the below table (table 85) summarize the Cronbach's Alpha value of each factor, the results show that all the Cronbach's Alpha values are greater than 0.7, this means that all factors are highly reliable.

Table 85 Reliability Statistics

	Reliability Statistics	
	Cronbach's Alpha	N of Items
F1	0.850	6
F2	0.799	3
F3	0.711	2

5. Weighting

Table 86 Weighting Calculations-Results

Factor Loading				**Squared Loading**	**Sum of Squared Loading**	**Weight**
	Factor					
	1	2	3			
R6	0.878			0.771	3.022	26%
R5	0.760			0.578		19%
R7	0.746			0.557		18%
R4	0.643			0.414		14%
R3	0.623			0.389		13%
R8	0.561			0.315		10%
R9		0.944		0.892	2.538	35%
R11		0.936		0.875		34%
R10		0.878		0.771		30%
R1			0.924	0.855	1.704	50%
R2			0.922	0.850		50%
	42%	35%	23%	7.264		

F1= 26%*R6+19%*R5+18%*R7+14%*R4+13%*R3+10%*R8

F2= 35%*R9+34%*R11+30%*R10

F3= 50%*R1+50%*R2

Results Perspective = 42%*F1+35%*F2+32%*F3

F1: Financial Results = 26%*Profitability+19%*Market share+18%*Cash flow+14%*Turnover rate+13%*Value for money+10%*Revenue growth Profitability measure has the highest weightage with 26% which is logical as the main goal of any organisation it to get a good profit, then Market share with 19 % which shows the position of the organisation within the market , Cash flow measure has also 18% which shows the healthy financials in terms of cash

F2: Customer Satisfaction = 35%*Customer Results Performance Indicators+34%*Reoccurring business+30%*Corporate Social Responsibility

Customer satisfaction is measured with three main measures and with approximately equal percentage, this shows the importance of each obviously the customers results performance has the highest score, reoccurring business is considered very important indicator when measuring customer satisfaction as well

F3: Society/Community Results = 50%*Society Results Performance Indicators + 50%*External Awards

This factor was divided into two measures with equal weightage percentage which shows the importance of each one and this covered responsibility towards the society and the external awards that each company may targeting to achieve.

F1: Financial Results = 26%*Profitability+19%*Market share+18%*Cash flow+14%*Turnover rate+13%*Value for money+10%*Revenue growth
F2: Customer Satisfaction = 35%*Customer Results Performance Indicators+34%*Reoccurring business+30%*Corporate Social Responsibility
F3: Society/Community Results = 50%*Society Results Performance Indicators+50%*External Awards
Results Perspective = 42%* **Financial Results** +35%* **Customer Satisfaction** +32%* **Society/Community Results**

Financial Results has the highest weightage within the results perspective with 42% which is logical as the main goal of any organisation it to get a good financial results,

Customer Satisfaction with 35% and Society/Community Results with 32% these two factors are absolutely important as without customer satisfaction and good involvement with the community organisation can not considered successful neither can achieve the targeted growth.

7.5 Conclusion

In this chapter, the quantitative analysis was used to support the qualitative data and to strengthen the issues identified through the qualitative analysis. The quantitative analysis should not be regarded as a separate study but rather as part of the triangulation method adopted.

The findings of the focus group were used to design the survey questionnaire to gather the opinion of a wider sample FM sector. The contacts that the researcher has with the FM professionals from the academia and the industry had a great influence on the questionnaire development process. The statistical analysis was consequently conducted using SPSS software. The results of the questionnaire were presented and the comparison was executed to show the differences among dimensions and their components within the two approaches (EFA and Focus Group). The Factor Analysis confirmed the relationships between FM measures which were identified in the focus group workshop and the possibility to integrate and combine the factors and their measures .Moreover, factor analysis was used as a weighting technique to provide the weighting for each measure within the diminution and weighting of each dimension with the perspective, this was presented in table 87.

The established model was represented in figure 43; however, it required further testing to examine its validity. The next chapter will present the validation of the model using empirical statistical technique with the confirmatory factor analysis process (CFA), then the experts who are experienced in the Facilities Management industry and Performance management systems where asked to give their opinion and feedback on the proposed model.

Table 87 Performance dimensions and measures with their respective weighting

Enablers						
16% Processes and Procedures	Appropriateness and suitability of standards	26%		11% Learning and Growth	New Service introduction	17%
	Assets maintenance Management	16%			Marketing Management	21%
	Risk Management	15%			Benchmarking	18%
	Effective Internal communication	15%			Staff training and development	25%
	Mobilization	14%			Innovation	11%
	Inventory performance	10%			Business Continuity	7%
	Standards Necessary revised on a regular basis	10%		11% Leadership	Leaders develop the mission, vision and values	24%
13% Productivity	Service Delivery Performance	19%			Effective implementation of changes	22%
	Resource utilisation	20%			Leaders engage with external stakeholders.	22%
	Help Desk/Call centre Performance	18%			Excellence Culture Reinforcement by Leaders	16%
	Achievement of completion deadlines	13%			Leaders Performance Management	16%
	Planning and Scheduling	13%		10% Partnership and Resources	Contract management	30%
	Service reliability	10%			Customer relationships Management	23%
	Workforce and Teamwork Management	8%			Client-service provider relationship	22%
12% Human Resources	Employees Recognition	23%			Supply chain management	16%
	Team satisfaction	20%			Appropriateness and suitability of service levels	10%
	Facilities management culture	20%		7% Technology	Technology Management	34%
	Roles and responsibilities are clearly defined	15%			Information and Knowledge Management	34%
	Competence of staff	14%			CAFM usage	32%
	Staff commitment	8%		8% Health, safety and Environment	Environmental Sustainability Management	24%
12% Policy and Strategy	Strategy is developed, reviewed and updated	21%			Health and Safety	22%
	Strategy is based on understanding the stakeholders needs	18%			Waste management	16%
	Strategy is communicated, implemented and monitored.	18%			Indoor Environment Quality	14%
	Adherence to policies	15%			Periodic HandS audit	14%
	Appropriateness of policies	15%			Statuary Compliance	11%
	Policies Necessary revised on a regular basis	13%				

Results				
Financial Results	42%		Customer Satisfaction	35%
Profitability	26%		Customer Results Performance Indicators.	35%
Market share	19%		Reoccurring business	34%
Cash flow	18%		Corporate Social Responsibility	30%
Turnover rate	14%		Society/Community Results	32%
Value for money	13%		Society Results Performance Indicators.	50%
Revenue growth	10%		External Awards	50%

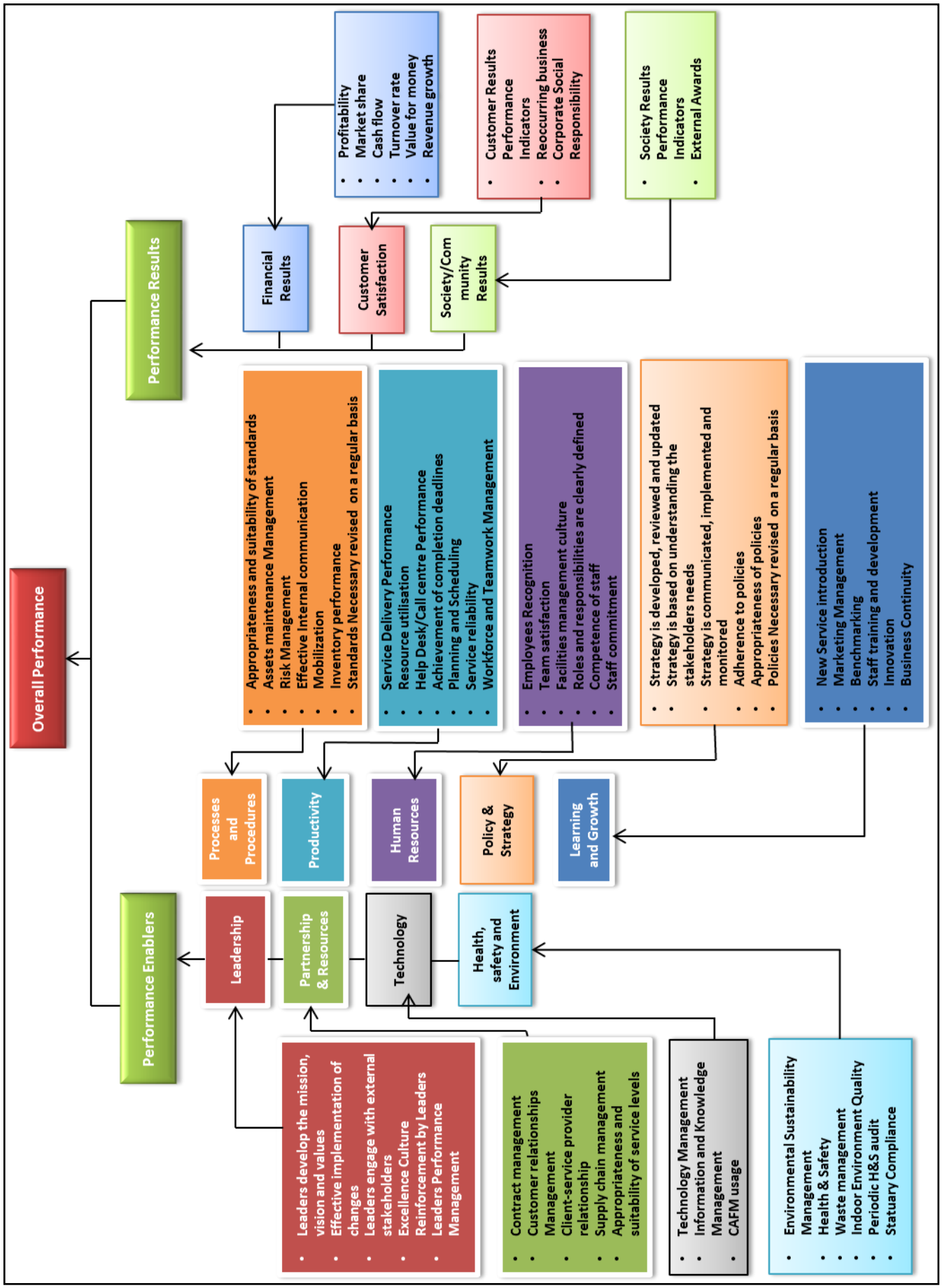


Figure 43 Model Graphical Representation

Chapter 8 - MODEL VALIDATION

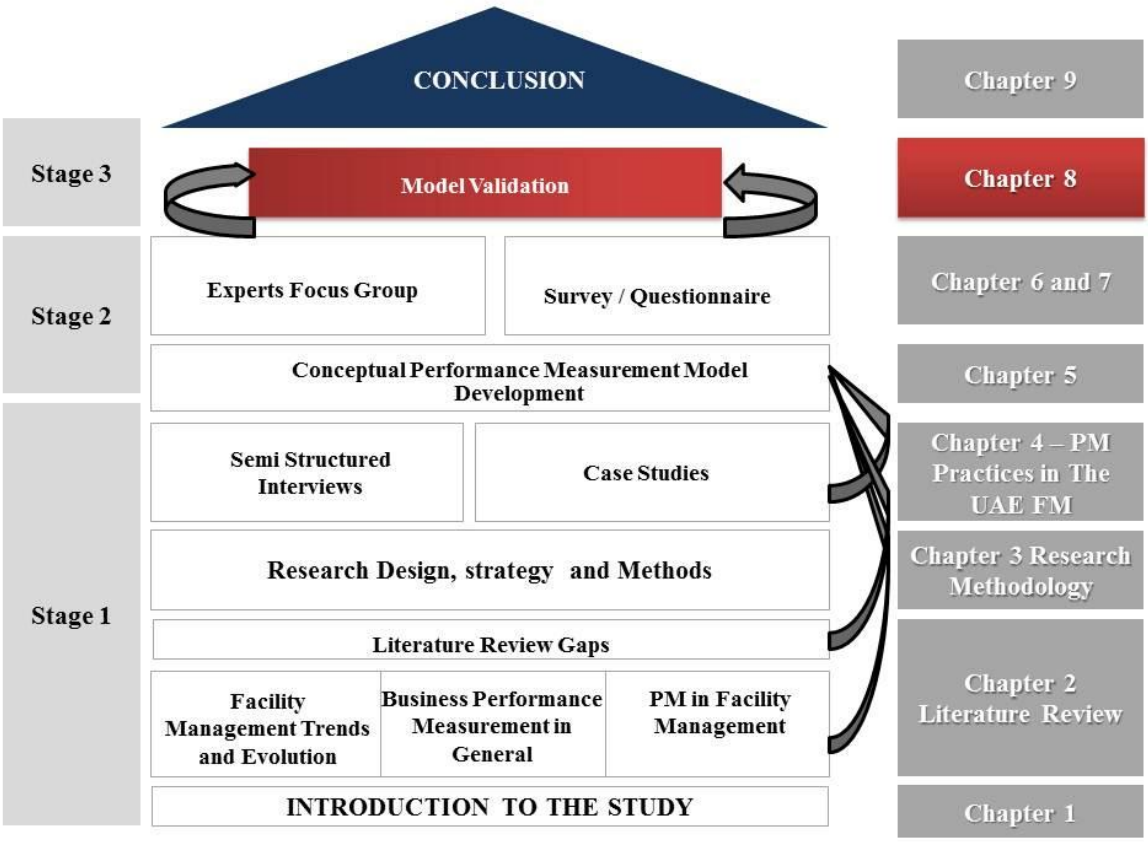


Figure 44 Research Structure - Chapter 8 Model Validation

8.1 Introduction

The eighth chapter, as shown in figure 44, is the validation chapter, this chapter presents the validation of the model that was developed during previous stages. The model validation, which is the last phase of the study, was conducted using two consecutive methods first is empirical using statistical technique called Structural Equation Modelling with the confirmatory factor analysis process(CFA), then the model was presented to experts who are experienced in the Facilities Management industry and Performance management systems and asked their opinion about the feasibility of the model, and the suitability of its structure and the performance measures.

The next sections will discuss the approaches used, validation results, evaluation of the model and the improvement aspects suggested, and a concluding summary.

8.2 The Purpose of Validation

Validation is a key part of model development process which increases the confidence in the model and makes it more valuable (Kennedy, *et al*, 2005). It has been defined by Mishler (1990) as the process to evaluate the "trustworthiness" of reported observation, interpretations and generalisation.

8.3 Confirmatory factor analysis process (CFA)

The best way to validate a conceptual model is to do a good empirical research. Structural Equation Modelling (SEM) is great for this; it uses various types of models to depict the relationships among observed variables (Schumacker and Richard 2004).

Measurement model validity depends on establishing acceptable levels of goodness-of–fit for the measurement model and finding specific evidence of construct validity. Confirmatory Factor Analysis (CFA) using AMOS 22 was used to evaluate the model fit of the measurement model to confirm the hypothesized structure. CFA is conducted for assessing the "fit" of the indicators representing the latent variables. Hinkin et al. (1997) said that confirmatory factor analysis is used to assess the quality of the factor structure by statistically testing the significance of the measurement model.

Confirmatory factor analysis (CFA) is a complex approach that tests the hypothesis that the items are associated with specific factors. CFA uses structural equation modelling to test a measurement model whereby loading on the factors allows for evaluation of relationships between observed variables and unobserved variables, and the analysis would demonstrate loadings of observed variables on the latent variables (factors), as well as the correlation between the latent variables.

According to Schumacker and Lomax (2004) and Zulu (2007), SEM includes the below five steps:

1. Model specification, which involves establishing relationships among latent variables.
2. Model identification, which involves establishing whether the model can be estimated.
3. Model estimation and data collection

4. Model Assessment and Test of fit

5. Model modification to improve the goodness of fit

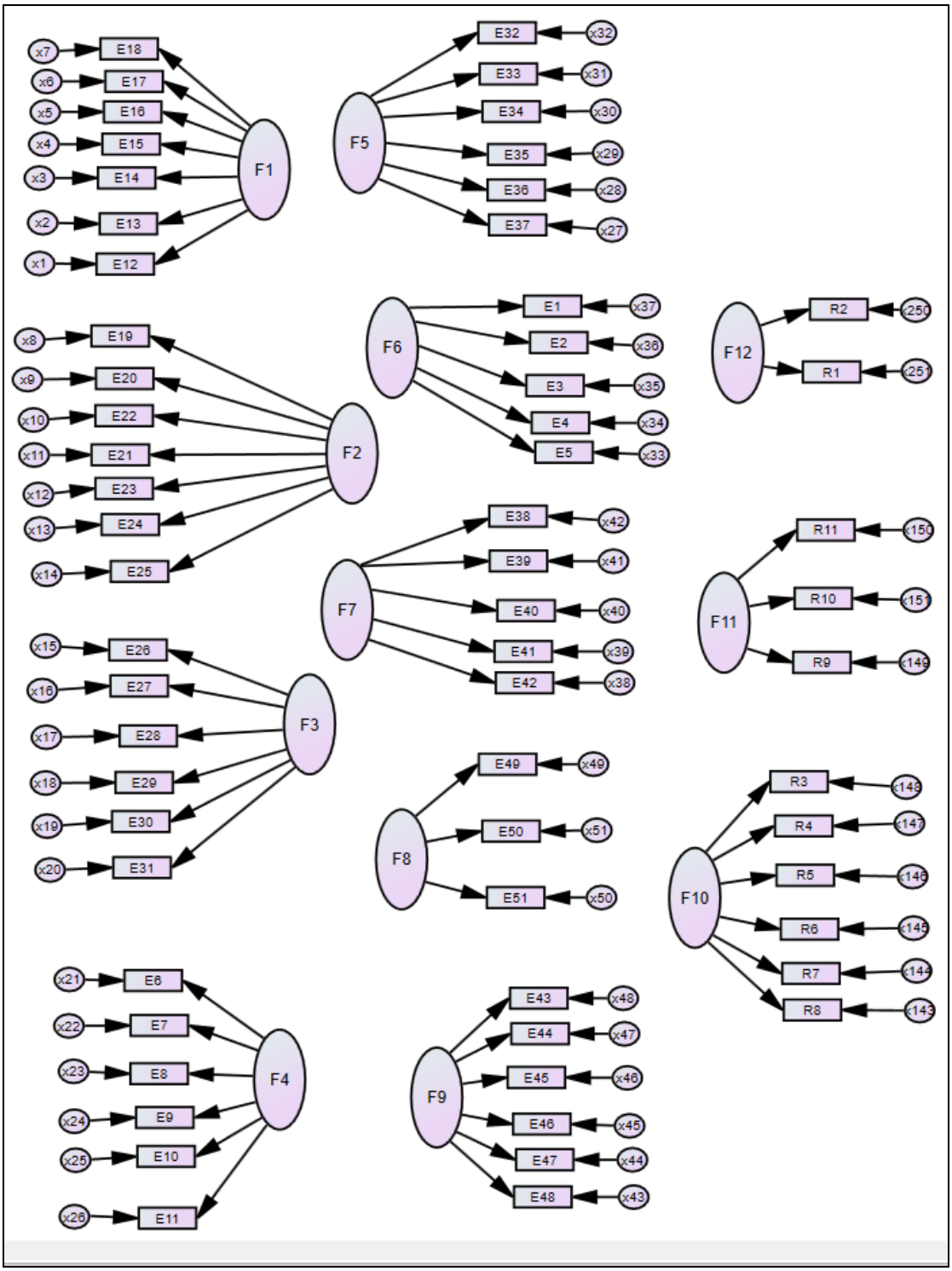
8.3.1 Model specification

The specification of the model of this study involving theoretical justification of the relationships in the model was established in the previous chapter.

8.3.2 Model identification

The Model identification was carried out in the previous chapter using the exploratory factor analysis, where Principal axis factoring and Varimax rotation was used to confirm or otherwise re-structure the proposed structure which resulted from the focus group workshop.

Figure 45 Model Diagram –AMOS Input



8.3.3 Model estimation

Maximum Likelihood Estimating (MLE) was used in this research based on the recommendation of Levin *et al*. (2005) and Byrne (2010) that it is the most efficient and widely used technique. The term maximum likelihood describes the statistical principle that underlies the derivation of parameter estimates: the estimates are the ones that maximize the likelihood that the data were drawn from this population. That is, ML estimators are those that maximize the likelihood of a sample that is actually observed (Winer, Brown, and Michels, 1991). AMOS software version 22 was used the same data generated from questionnaire survey imported in SPSS software.

For the sake of testing the measurement model, CFA was established using recommended levels of parameter estimates, and goodness of fit (GOF) indices (Byrne, 2010).

Parameter estimates were assessed based on three criteria:

1. Feasibility of parameter estimates,
2. Appropriateness of the standard errors (S.E.),
3. Statistical significance of the parameter estimates

Firstly, parameter estimates should display the correct sign and size, and to be consistent with the underlying theory. Examples of parameters exhibiting unreasonable estimates are correlations > 1.00, negative variances, and covariance or correlation matrices that are not positive definite (Byrne, 2010). Secondly, standard errors reflect the precision with which a parameter has been estimated, with small values suggesting accurate estimation. Thus, another indicator of poor model fit is the presence of standard errors that are excessively large or small. For example, if a standard error approaches zero, the test statistic for its related parameter cannot be defined (Bentler, 2005). Likewise, standard errors that are extremely large indicate parameters that cannot be determined (Joreskog and Sorbom, 1993). Lastly, the test statistic here is the critical ratio (C.R.), which represents the parameter estimate divided by its standard error (S.E.). Based on a probability level of 0.05, then, the test statistic needs to be > ±1.96. It is important to note that non-significant parameters can be indicative of a sample size that is too small (K. G. Joreskog, 1997). When the critical ratio (CR) is > 1.96 for a regression weight, that path is significant at the .05 level or better (that is, its estimated path parameter is significant). In the p-value column, three asterisks (***) indicate significance smaller than .001. The significance of

estimated covariance among the latent variables is assessed in the same manner: if CR > 1.96, the factor covariance is significant.

As shown in Appendix F, results are presented separately for the factor loadings (listed as regression weights), the covariances (in this case, for errors only), and the variances (for both factors and measurement errors). The parameter estimation information is presented in the AMOS text output file. Estimated value is listed to the right of each parameter (Column 1), standard error (Column 2), critical ratio (Column 3), and probability value (Column 4).

An examination of the output file (Appendix F) and the path diagram (figure 46) showed that almost all estimates are statistically significant and all standard errors appear also to be in good order. Moreover, AMOS did not report any error when estimates were calculated.

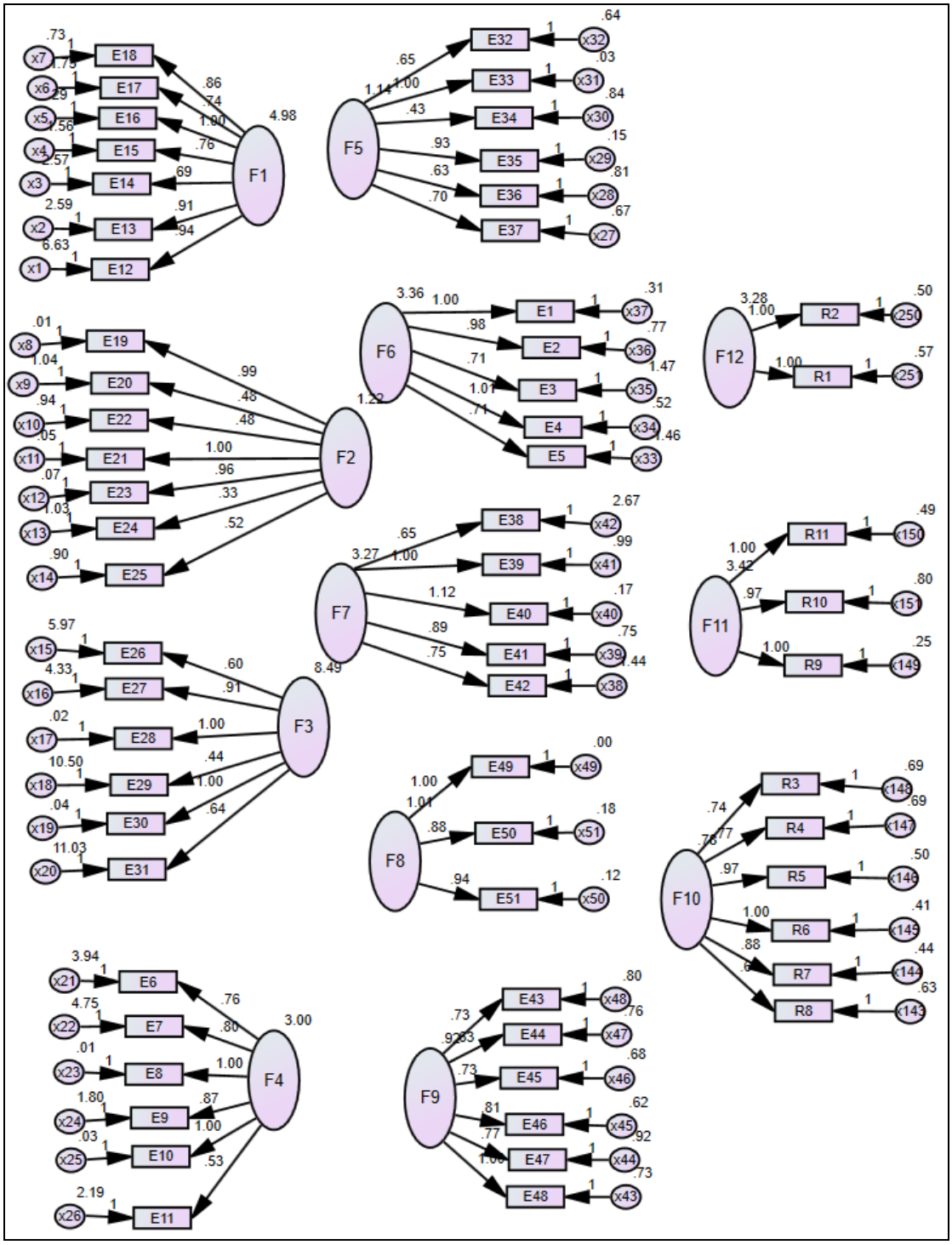


Figure 46 AMOS Graphics: Output path diagram

8.3.4 Model Assessment and Test of fit

Overall fitness of measurement models to data is generally assessed using goodness of fit indices. Hair *et al*. (2010) categorised GOF indices into the below two groups.

1. *Absolute fit measures, and*
2. *Incremental or baseline fit measures*

Absolute fit measures includes the ratio of chi-square ($\chi 2$) to degree of freedom ($\chi 2$/df), the goodness of fit index (GFI), and root mean square error of approximation (RMSEA), these indices are commonly preferred when assessing the overall Model fit These measures provide the most fundamental indication of how well the proposed theory fits the data. Unlike incremental fit indices, their calculation does not rely on comparison with a baseline model but is instead a measure of how well the model fits in comparison to no model at all (Jöreskog and Sörbom, 1993).

Incremental fit indices, also known as comparative (Miles and Shevlin, 2007), are a indices that do not use the chi-square in its raw form but compare the chi-square value to a baseline model (McDonald and Ho, 2002).

The first is the Normed Fit Index (NFI: Bentler and Bonnet, 1980). This statistic assesses the model by comparing the $\chi 2$ value of the model to the $\chi 2$ of the null model. Bentler and Bonnet (1980) recommending values greater than 0.90 indicating a good fit. Tucker-Lewis index (TLI) an index that prefers simpler models. However in situations were small samples are used, the value of the NNFI can indicate poor fit despite other statistics pointing towards good fit (Bentler, 1990; Kline, 2005; Tabachnick and Fidell, 2007 Bagozzi and Yi (2012) suggested TLI $\geq$ 0.9 as the threshold.

The Comparative Fit Index (CFI), this index was introduced by Bentler (1990). Like the NFI, this statistic assumes that all latent variables are uncorrelated and compares the sample covariance matrix with this null model. A cut-off criterion of CFI $\geq$ 0.90 is adopted (Kline, 2005).

Reporting fit indices

With regards to which indices should be reported, it is not necessary or realistic to include all the indices generated by the software as it will burden the reviewer. In a review by McDonald and Ho (2002) it was found that the most reported indices are the CFI, GFI, NFI and the (TLI). While there are no golden rules for assessment of model fit, reporting a variety of indices is necessary (Crowley and Fan, 1997) because different indices reflect a different aspect of model fit. Although the Model Chi-Square has many problems

associated with it, it is still important that this statistic, along with its degrees of freedom should be reported all the times (Hayduk et al, 2007). Moreover, Kline (2005) recommends including the use of the Chi-Square test, the RMSEA and the CFI.

Based on this, this study adopted the recommended indices to be reported, table 88 below shows used indices, recommended values with their respective sources, and the generated output statistics from AMOS software.

Table 88 Fit indices and their values

Model Fit Summary					
	Fit Index	**Recommended**	**Source**	**First Trial**	**Second Trial**
Absolute Fit Indices	Relative χ^2 (χ^2/df)	<2	2:1 (Tabachnik and Fidell, 2007) and 3:1 (Kline, 2005)	2.701	1.986
	Root Mean Square Error of Approximation (RMSEA)	<0.1	(Tabachnik and Fidell, 2007)	0.097	0.069
	GFI	>0.9	Bagozzi and Yi, 2012	0.732	0.867
Incremental Fit Indices	NFI	>0.9	Doloi *et al.*, 2011	0.744	0.878
	(TLI)	>0.9	Bagozzi and Yi, 2012	0.788	0.909
	CFI	>0.9	Kline, 2005	0.771	0.903
	IFI	>0.9	Molenaar *et al.*,2000	0.813	0.911

The initial model's overall GOF, as indicated by model fit indices in table 88, shows that the indices are near to the recommended value, but did not reach the satisfactory level. Based on this required modifications were conducted using modification indices proposed by report output, this was discussed in the next section.

8.3.5 Model modifications/ Re-specification Using Modification Indices

It is common that the proposed model doesn't fit well at first. Sometimes model modification is required to obtain a better-fitting model (Schreiber et. al., 2006). A common way in which model fit can be improved is through the correlation of error variables.

However, if a researcher decides to correlate error variables then he needs to have a theoretical justification behind such move (Jöreskog and Long, 1993). Moreover, it was highlighted by Jöreskog and Long (1993) that correlating error within the same factor is easier to justify than across latent variable because this doesn't damage the internal consistency.

AMOS software provides a list of potential modifications that can be used to improve the model fit, a review to the suggested parameters and their relevant modification indices (M.I.) were conducted, to see if there are paths that could be added to improve the model fit and make a theoretical sense.

In this regard, table 89 shows the modifications executed, the selection of these modifications were based on the below criteria:

1. Error covariance within the same factor
2. Relevant to theory or can be justified
3. With Highest Modification indices(M.I.)

Table 89 Error covariance based on Modification Indices

x18	<-->	x16		E29	<-->	E27
x21	<-->	x22		E6	<-->	E7
x33	<-->	x35		E5	<-->	E3
x24	<-->	x26		E9	<-->	E11
x9	<-->	x10		E20	<-->	E22
x10	<-->	x13		E22	<-->	E24
x10	<-->	x14		E22	<-->	E25
x4	<-->	x6		E15	<-->	E17
x2	<-->	x3		E13	<-->	E14
x41	<-->	x42		E39	<-->	E38
x39	<-->	x40		E41	<-->	E40
x18	<-->	x20		E29	<-->	E31

Table 90 Proposed measures correlations based on MI

Measure			**Related Factor**	
Staff commitment	<-->	Employees Recognition	F3	Human Resources
Adherence to policies	<-->	Appropriateness of policies	F4	Policy and Strategy
Excellence Culture Reinforcement by Leaders	<-->	Leaders Performance Management	F6	Leadership
Strategy is developed, reviewed and updated.	<-->	Policies Necessary revised on a regular basis	F4	Policy and Strategy
Service reliability	<-->	Achievement of completion deadlines	F2	Productivity
Achievement of completion deadlines	<-->	Workforce and Teamwork Management	F2	Productivity
Achievement of completion deadlines	<-->	Planning and Scheduling	F2	Productivity
Effective Internal communication	<-->	Mobilization	F1	Process and Procedures
Risk Management	<-->	Standards Necessary revised on a regular basis	F1	Process and Procedures
Customer relationships Management	<-->	Appropriateness and suitability of service levels	F7	Partnership and Resources
Client-service provider relationship	<-->	Contract management	F7	Partnership and Resources
Staff commitment	<-->	Competence of staff	F3	Human Resources

F1- within Process and Procedures factor: Effective Internal communication and Mobilization are correlated and this is logic as there will be no successful Mobilization if the communication were not set properly, Also Standards Necessary revised on a regular basis and Risk Management to be correlated and they can have an impact on each other's

F2- Productivity: Workforce and Teamwork Management and Achievement of completion deadlines obviously can impact each other because without the team work the deadlines completion will not be achieved and this will give a motivation to the team in other direction .Similarly, Planning and Scheduling has a direct and major impact on achieving the deadlines

F3- Human Resources: Employees Recognition and Staff commitment, Competence of staff and Staff commitment these measures have an impact on each other's within Human Resources factor, and this is logical and can be valid.

F4- Policy and Strategy: Policies Necessary revised on a regularly and Strategy is developed, reviewed and updated. Both measures are targeting the revision of Policy and strategies.

F6 – Leadership: Leaders Performance Management, this measure will have direct relationship with the Excellence Culture that is reinforced by the Leaders.

F7- Partnership and Resources: Appropriateness of service levels and Customer relationships Management, these measures has relationship and impact on each other's, if service levels agreement were set right then the relationship with the customer will be going in right direction.

Based on the modification indices, the models were re-specified and the below figure 47 shows the revised diagram:

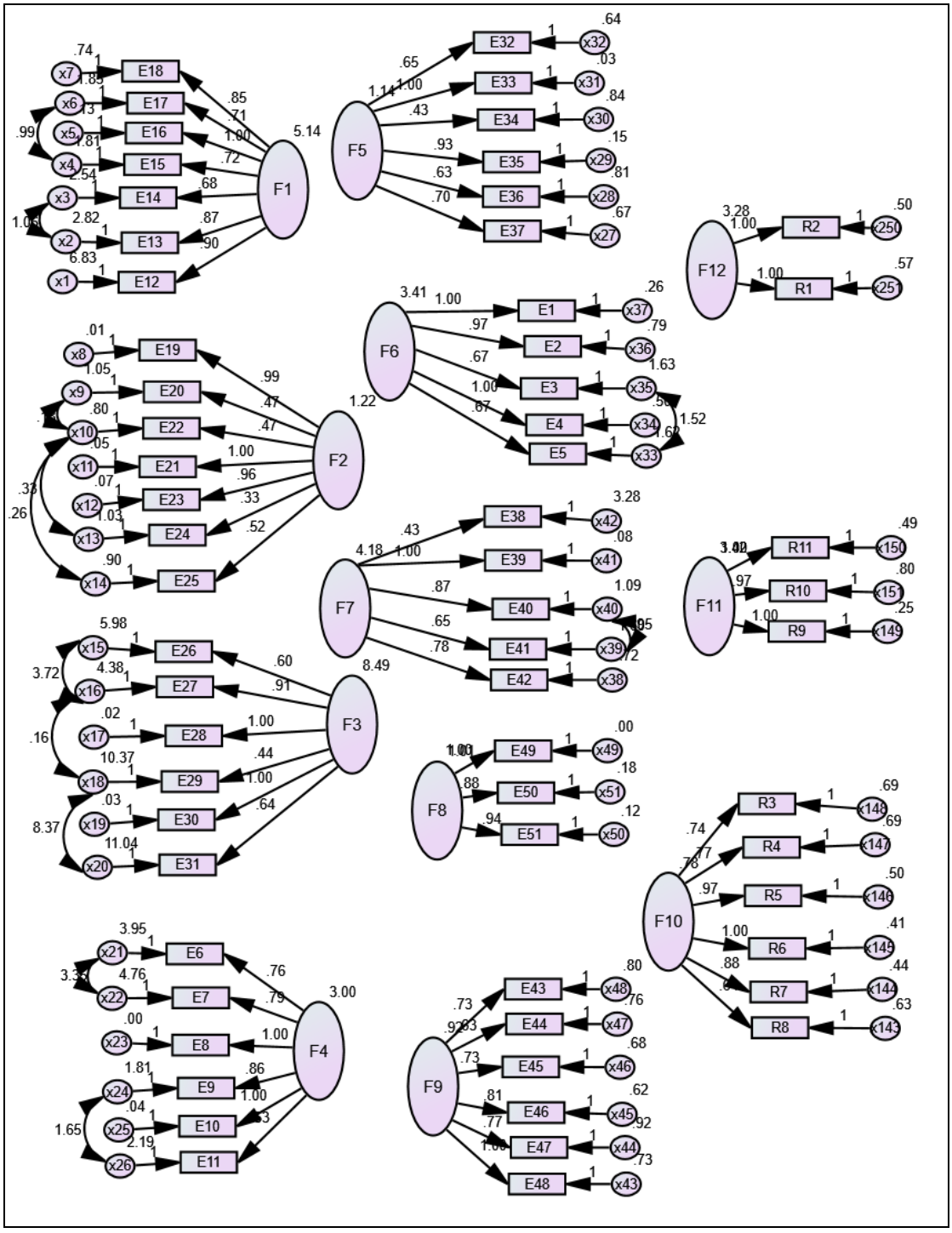


Figure 47 Re-Specified Model Diagram –AMOS Input

As shown in figure 47, the GOF results of the re-specified model are within the acceptable range. RMSEA is 0.069 well below the recommended limit of 0.1, Goodness of Fit index (GFI) is 0.867 and Normed fit Index (NFI) is 0.878 both are below 0.9 with very small value so they are considered tolerable as other indecies are higher that the recommended value. Tucker Lewis Index (TLI) 0.909, Comparative Fit index (CFI) 0.903 and IFI 0.911 are above the recommended level 0.90.

8.4 Validation through Experts Feedback

Lastly, expert feedback was required to evaluate the model, its structure and measures. This step was to develop a questionnaire indicating the areas where experts' opinions are required. The questionnaire was created taking into consideration a number of criteria for validating a model using a literature review of PM model characteristics. A short list was produced including the below criteria:

1. The overall performance measurement model
2. Performance measures
3. The structure of the model

Moreover, the experts commented on:

1. The model's strong points
2. The Model's weak points
3. Any suggestions for improvement

The performance measurement model was evaluated based on tables (47, 48 and 49) presented in chapter 5, which presented the shortlist of fourteen criteria that were categorized in three main categories which defines a successful PM model: The overall performance measurement model(Comprehensiveness, Adaptable, Benchmarking capability, Usefulness of the model and Focused on improvement), the performance measures (Linked to strategy, Clear, Effective, Relevant) and the structure of the model(Balanced, logical structure, Clarity of the model, Comprehensibility, Weightage)

8.4.1 The Validation Questionnaire

As discussed earlier, the validation included a questionnaire, completed by a high qualified and experienced professional in FM and PM systems after their critical examination of the model .The questionnaire consists three sections (Appendix F).

- Section 1: general information about the experts.
- Section 2: included closed questions measured using the Likert scale (10 points- 1 being `not at all' and 10 being `significantly'.) which required the experts to rate the model generally, performance measures and the structure of the model.
- Section 3 the participants were asked to give their feedbacks on any additional comment on the model.

Along with the questionnaire, a brief description of the model was send to the selected experts.

8.4.2 Selection of the experts

For the validation results to be acceptable, it is essential that it produces useful and relevant opinions from qualified experts. This can only be achieved if the experts chosen to participate in the validation process have the required expertise and knowledge in the research domain. Based on that the participants were chosen carefully, and it is to be highlighted that the researcher has a good and professional relationship with those senior professional due to that that himself is a senior professional in FM industry and qualified in PM systems.

The contacted experts are listed below:

1. IFMA Lead Trainer
2. IFMA Lead Trainer
3. MEFMA Board Member
4. CEO of a Leading FM company in the UAE
5. Accredited EFQM Excellence Assessor
6. BSC professional and certifies trainer
7. FM consultancy Department Head

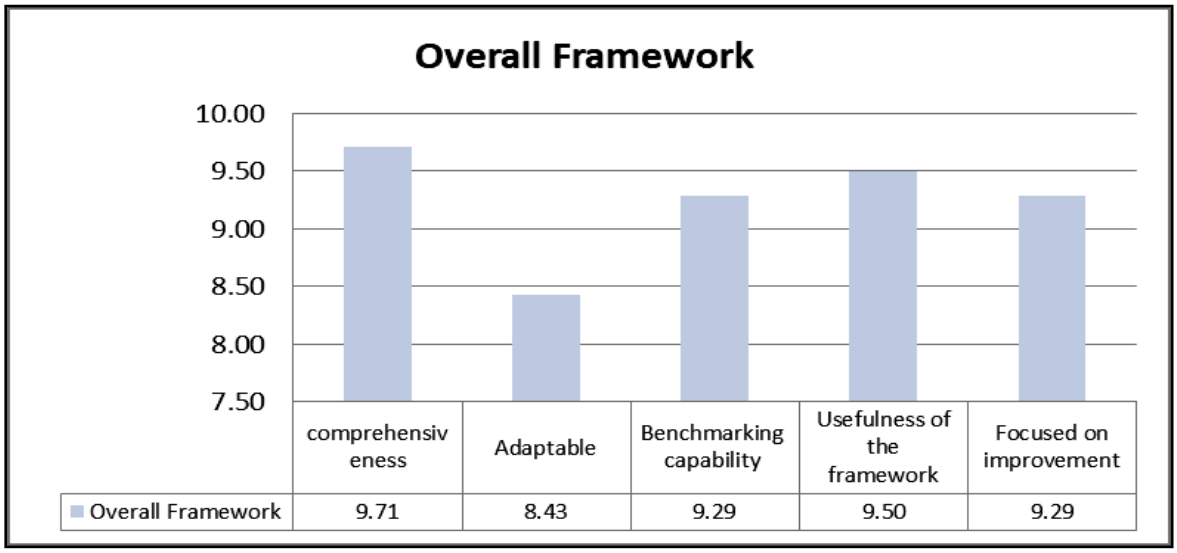
8.4.3 ***Results***

The results of the questionnaire are summarized below:

Overall Model Assessment:

Results on assessment of the model shown in below figure 48 indicate an overall positive assessment. For instance, the experts gave the highest scores to (Comprehensiveness) and (Usefulness the model) of 9.71 and 9.50 respectively this means that the model is considered as useful tool to measure performance focusing on the organisation "improvement" (9.29) and it covers all the performance criteria aspects , where adaptability (the performance measurement model be adaptable according to strategy has 8.43 score, and the Benchmarking for internal and external use has 9.29 this high score shows the capability of the model to be considered as a benchmarking tool .

Figure 48 Overall Model Assessment Results



Performance Measures:

Figure 49 below shows that the experts highly agreed that the model performance measures are clear useful and relevant with high scores of 9 and above. However linking the measures to criteria to the strategy has the core of only 8.14 this can be related to the fact the measures are predefined in the model, and not left to be decided by the organisation unlike the BSC methodology.

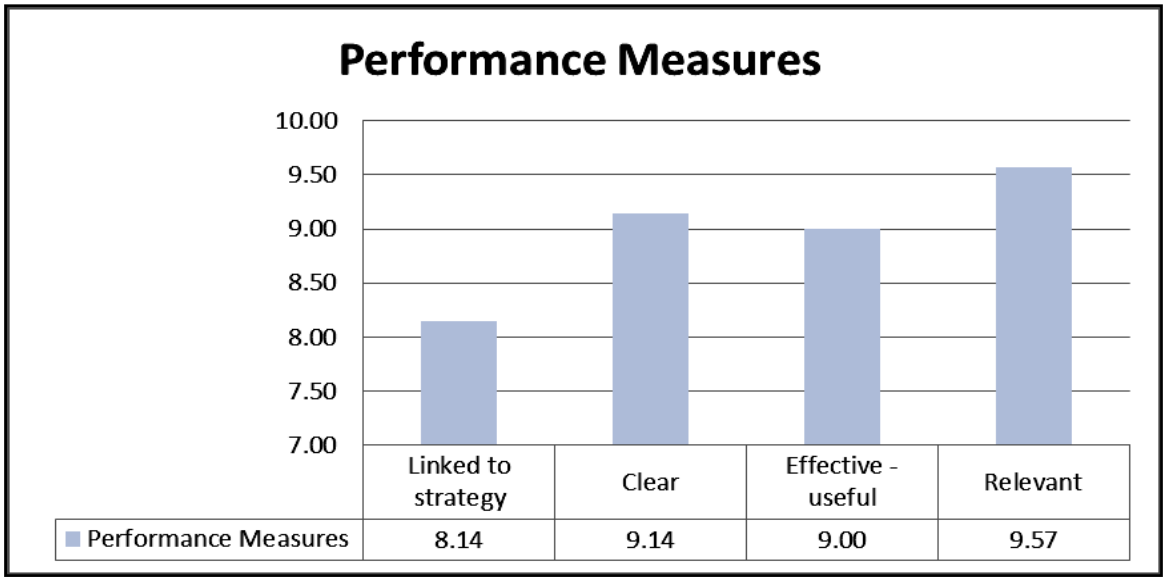


Figure 49 Performance Measures Assessment Results

Model Structure:

The figure below (50) shows that frame work has a clear and comprehensible (simple and understandable) structure with 9 and 9.14 score, and has logical and balanced structure with 8.71 and 8.86 scores respectively. However, the "weightage "has the lowest score (6.86) not only among the structure criteria but also among the whole fourteen criteria, this reflects that the experts are not much satisfied with weightings allocated and this was shown in the comments filled by the experts who suggested to keep the freedom to the organisation to put the weightage based on their strategy requirements.

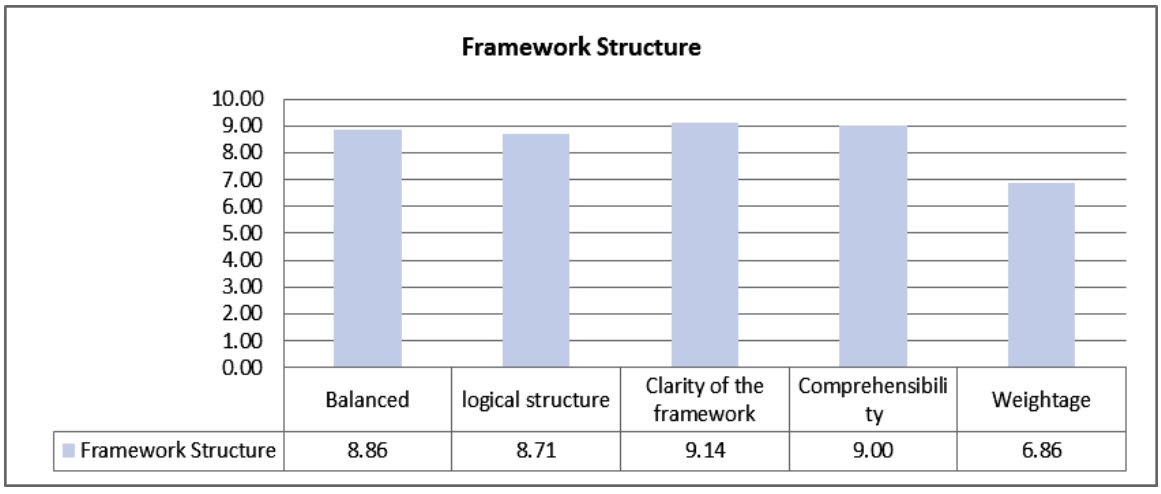


Figure 50 Model Structure Assessment Results

It is clear from the above that all participants are satisfied with the model. The participants were asked to give their feedbacks on any additional comment on the model. The comments of the participants were combined to illustrate the model's strong points, weak points and suggestions as follows:

Strong Points:

The feedback on the possible benefits of the model was very positive. Some respondents described the model as very interesting and support the performance improvement and it is balancing financial and non-financial measurement. In some cases, the reason for this was that experts from organisations already working with either EFQM or Balanced Scorecard were interested to have a comprehensive model related to FM. The comments agreed that the model is very comprehensive, useful, clear and free of ambiguity, and could be used for organisations other than facilities management services. Moreover, it has a benchmarking capability and can be used as benchmarking tool.

Weak points and suggestions:

However, some negative feedback was obtained on the model. Some comments concerned about the strategy side of the model, where one of the experts could not relate to how a strategy could be mapped and monitored. Another expert asked for the review of the weighting of criteria whilst others suggested keeping it without weighting so each company can put the targeted weightage based on their strategy and requirement. Also, several responses highlighted that; the performance measurement process and a structured methodology should be identified clearly and they gave an example of the RADAR technique in the EFQM excellence model. Moreover, a BSC expert suggested despite strategy being part of the model, all the measures should be clearly linked to vision, mission, and strategy, and they suggested having a flexibility of modifying the measurement system according to strategy. Furthermore, one comment suggested conducting a case study verification to check the practical workability of the model.

8.5 Conclusion

The model was validated; using two methods first is empirical analysis using the Structural Equation Modelling (SEM) that is a statistical technique with the confirmatory factor analysis process (CFA), followed by to experts review who are experienced in the Facilities Management industry and Performance management systems and asked their

opinion about the feasibility of the model, and the suitability of its structure and the performance measures.

The output report generated from AMOS presented an acceptable model indices that in turn shows an overall acceptable model fit. The model is an over identified model. The confirmatory factor analysis showed an acceptable overall model fit and hence, the theorized model fit well with the observed data. It can be concluded that the hypothesized factor CFA model fits the sample data very well.

Chapter 9 – CONCLUSION AND RECOMMENDATIONS

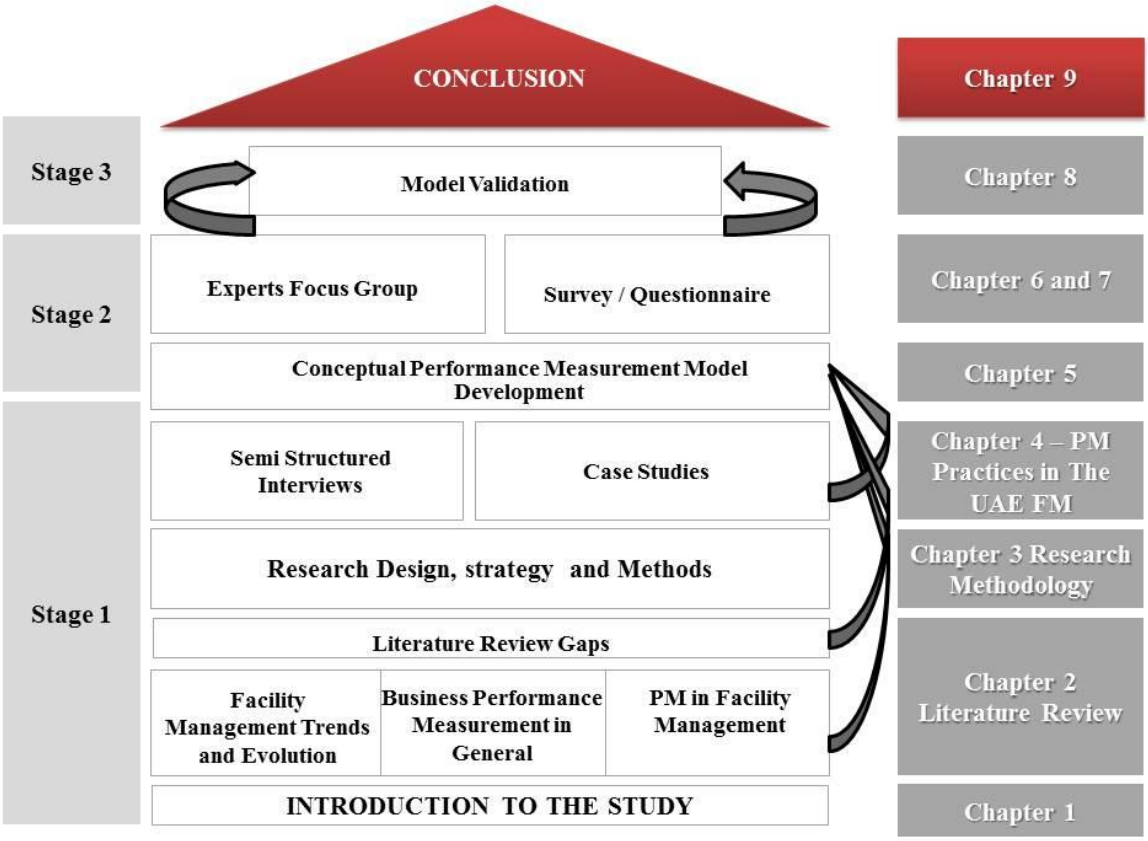


Figure 51 Research Structure- Chapter 9 Conclusion and Recommendations

9.1 Introduction

This Chapter concludes on the main summaries reflected throughout the thesis, the generalization pulled out from this study by reviewing the findings that successfully achieved the research objectives, the contribution of knowledge to the FM industry. It also proposes the limitations of this research as well as the recommendations for future research in the field of FM.

The key conclusions were presented linking back the findings to the research aim and objectives. It highlights the main considerations taken in the literature at first stage. The input of the case studies and the expert's interviews as well as the importance of the focus group were explained revealing out the barriers, difficulties or any kind of obstacles faced during this data collection.

Moreover, this chapter discussed the limitations of the research as well as the main recommendations proposed for future research in the field of facilities management in general and for the PM in the FM in particular.

9.2 Achievement of the research objectives

The ultimate aim of this research, as stated in Chapter 1, was to develop a comprehensive performance measurement model to be used by the facilities management organisations in the UAE.

In line with this aim, the objectives were summarized in chapter 1 as follows:

- **Objective 1:** To identify and assess the performance measurement models used in different sectors
- **Objective 2:** To review the facilities management scope, structures, models and evolution, with a specific focus on the UAE
- **Objective 3:** To explore the current performance measurement systems in the FM industry, and review how performance is measured in the FM organisations in the UAE
- **Objective 4:** To identify and evaluate the performance measures and criteria that defines the successful FM Organisation
- **Objective 5:** to develop a model based on the outcomes of the above objectives that measure the performance of facilities management organisations
- **Objective 6:** To evaluate and validate the proposed Performance Measurement Model

  Those objectives were focal points of interest of the researcher throughout this study.

First, the literature review covered in chapter 2 attempts to fulfil the first objective to understand the performance measurement systems, models and models in general and those which are specifically designed to the facilities management industry.

The FM industry had established itself as a key service sector supporting operationally and strategically any organisation. Based on the literature review, FM emerged officially in the 1970-1980s and expanded exponentially to respond to the business world needs. FM provides, nowadays, wide panoply of building maintenance services as well as strategic aspects of management support services contributing to reduce unnecessary costs and creating a better working environment. The FM focus on assisting organisations to achieve their strategic objectives and business goals, by managing and coordinating the physical facilities in order to provide effective workplace environment to employees. Various business models of the FM function were also reviewed and analysed based on their point of views with regards with the strategic role of the FM.

It was essential to review as well the FM industry in the UAE market with its characteristics. It can be concluded from the literature review and the practitioners' reports that FM in the UAE market is still immature. The existing practices identified within FM industry were acknowledged through the literature review, and the semi-structured interviews that were conducted to supplement the findings from the literature. Several issues were revealed, such as FM is still mainly being enlisted at the operational level, and not at the strategic level, the misperception of FM practices, lack of awareness and poor usages of best practices, etc... The FM is still in stage of development in the UAE.

In parallel, the performance measurement was identified in the last four decades as a vital need for the organisations to assess the organisation's wellbeing and to ensure a continuous improvement process. Performance measurement models identify opportunities for progressive improvement in performance and ensures that added value is achieved. Various performance measurements were conceptualized to overcome the shortcomings of the accounting based performance models. The BSC and the EFQM were the most widely used models. Both of them are multidimensional covering the various aspects of the organisational performance; BSC, a strategic model, focuses on the internal benchmarking while the EFQM, described as a static model, focusing on the

external benchmarking and the self-assessment tool comparing to the business excellence models.

The third section of the literature review was the linkage between the PM and the FM. Despite the increasing number of studies reviewing FM practice in PM, PM in FM is a less developed area in the literature. Previous studies have revealed that there is a lack of a robust PM with comprehensive set of performance measures for FM. This study examined the practice of PM in FM by looking into the advantages and disadvantages of the current PMSs in order to develop a comprehensive model.

It has been shown also that the integration of PM elements in FM is essential in exercising the strategic development process and practice of FM. There is also a recent emerging need to develop indicators for performance measures as FM functions are not all easy measurable such as sustainability, innovation , green initiatives, etc..

A study of both literature and data analysis findings of the stage I (semi structured interviews and case studies) has also indicated that the FM industry in UAE is still lacking in performance guidelines and model of strategic FM to be followed by practitioners. Service Providers conform to the guidelines imposed by the client in their contracts. They inherit the client performance measurement method without getting the right knowledge. Many FM service providers apply the same BSC to their internal structure or apply to adjust their documentation to apply to local quality awards. It is worth noting that based on the case studies; the Balanced Scorecard comes in second place after the EFQM in the UAE FM organisations. However, FM organisations recognize that this model is very effective in implementing improvements aligned with the mission/vision of the organisation, accurately measure the results and track trends.

Then a conceptual performance measurement model was developed by identifying the model format, and the performance dimensions and measures to be used in the proposed model. Identification of these components were done by the combining performance dimensions and measures from relevant literature review, case studies and the existing measurement models and models. As a result the conceptual model consisted of three levels: performance perspectives level (with two perspectives: enablers and results), performance dimensions level (16 performance dimensions) and performance measures level (77 performance measures).

Then, in stage two of deductive approach, a focus group workshop was conducted to explore the opinion of facilities management experts in the UAE, in order to assess the generated measurement items proposed in the conceptual model, and to adjust what is needed to make it appropriate for the FM industry in the UAE.

The outcome of the workshop recommended keeping 12 dimensions and 55 measures, and added seven extra performance measures to the proposed model, so the final total number of measures became 62. Then the measures were categorized into the identified dimensions, and the dimensions into the two main perspectives (enablers and results measures).The final outcome was 9 dimensions with 51 measures as performance enablers, and 3 dimensions with 11 measures as performance results.

As a result, and upon the focus group discussions and data findings, the conceptual model of FM business performance measurement was revised, which in turn required further investigation through the use of quantitative research techniques. Therefore, the findings of the focus group were used to design the survey questionnaire to gather the opinion of a wider sample FM sector.

The collection of the respondent's contacts was done during the focus group workshop and from MEFMA data base of FM professionals of the UAE market. Total 335 questionnaires were distributed in and 205 were filled and returned back with gives a total response rate of 61.19%. The participants were asked to indicate to what extent they agree that each of the proposed performance measures can be used to measure FM organisation performance. The data collected was subjected to factor analysis and using SPSS 24 software to establish the structure of the measurement model and uncover the performance dimensions in each perspective. The results were presented and the comparison with focus group workshop outcomes was executed to show the differences among dimensions and their components within the two approaches. The factor analysis confirmed the relationships between FM measures which were identified in the focus group workshop and the possibility to integrate and combine the factors and their measures. Moreover, factor analysis was used as a weighting technique to provide the factor weighting for each measure within the dimension and weighting of each dimension within the two perspectives.

The model validation, which is the last phase of the study, was conducted using two consecutive methods. First is empirical using the structural equation modelling that is a

statistical technique with the confirmatory factor analysis process (CFA), the output report generated from AMOS software, used to conduct the statistical analysis , presented an acceptable model indices that in turn shows an overall acceptable model fit.

Secondly, the model was presented to experts who are experienced in the facilities management industry and performance management systems and asked their opinion about the feasibility of the model, and the suitability of its structure and the performance measures.

The results showed notable acceptance of the model by the industry experts who described it as very interesting model and support the performance improvement, the overall model was found comprehensive, practical, useful and clear. And the performance measures used in the model were found clear and relevant. However, although the expert's feedback gave good scores to the model structure for its simplicity, clarity and balanced dimensions, it was suggested to keep the freedom to the organisation to put the weightage based on their own strategy requirements

9.3 Contribution to knowledge

This study aimed to overcome the challenges faced by the FM industry in UAE with regards with their performance management and their service delivery excellence by proposing a comprehensive performance measurement model. This model is meant to be aligned to the new business requirement and trends, to encompass all the performance measures of the FM industry and to be easily adopted and implemented by the practitioners.

The researcher trusts the contribution of this study would be on the academic and the industry level.

9.3.1 On the Industry Perspective

This study explored profoundly the FM market in the UAE along with its practitioner's practices in PM. The different sources of data collection ensure that all aspects are covered and that the different samples adopted aggregated represent genuinely the FM sector (population)

This dissertation presents a significant contribution to knowledge by exploring the implementation of Performance Measurement (PM) in Facilities Management (FM).It seeks to understand the key elements in measuring FM service performance and to develop a model that can be used by FM practitioners in the UAE.

The development of this model allows the FM service providers to obtain a comprehensive model to be adopted. It includes the performance measures of the BSC and the EFQM, the most widely PM models used, as well as the additional measures recommended by the practitioners and the FM experts.

With the development of the model, it is hoped that organisations will have a clear guideline of a comprehensive performance model which guides them to make a solid base of structured processes and allow them to benchmark internally and externally their departments and services in order to achieve excellence and continuous improvement.

9.3.2 On the Academic Perspective

This study triggers new opportunities for further academic research. The previous studies and existing models gave birth to general performance indicators applied to FM rather than focused ones.

Although the Performance Management subject is widely considered by researchers, the focus of PM in relation to facilities Management organisations performance is still missing the interest and the required coverage. So this dissertation opened up new possibilities for academic research, and will emphasise an in-depth understanding of performance measures and criteria that need to be highlighted in the literature. And it gave an overview of the PM approaches in the FM practice, which will serve as a good reference for other researchers.

Since the literature still lacks specific industry based models, this model is pioneer in this field as it introduces to the performance measurement new indicators such as sustainability, mobilization, and others, etc.

Also, this study conducted a robust research methodology based on a triangulation of methods, quantitative and qualitative and a validation of the model. The three approaches

involved in this study ensure the validity and reliability of the findings. The study adopted an inductive approach and proposed based on the literature review and the qualitative case studies and interviews a PM model. The study then inquired, in a deductive approach, the FM expert's opinions through a focus group and then the wider sector through a questionnaire survey. The research validated the proposed and adjusted FM PM model in a third inductive approach.

9.4 Research limitations

Although the dissertation has achieves its aim and objectives, and similar to any other study, it is subject to certain limitations which are listed below:

- The study was conducted in one country only (the United Arab Emirates). Thus, differences between different markets and countries were not observed.
- Although, the response rate was high (61%), attention should be paid to the possible impact of non-responses. And, even though the sample widely covers the UAE FM market, it is still relatively small as per statistical point of view.
- The dissertation findings are mostly applicable in large FM organisations. The majority of the facilities management companies in the UAE are medium and small sized where FM is usually integrated with other functions and doesn't have a main role. In large companies, the importance of performance measurement is quite obvious. However, this is not always so true for small and medium sized companies.
- The research focused mainly on EFQM excellence model, when talking about Business Excellence Models (BEM), and did not take into consideration other important and well known excellence models like Baldrige, the Australian Quality Award and Japanese Deming prize.

9.5 Recommendations for further research

During the interviews and discussions with practitioners, academicians and FM experts, the researcher gathered a set of recommendations industry and research levels.

a. ***Industry and Organisational level***

- Middle East Facilities Management Association has a big role to play in increasing the public awareness and knowledge about the importance of the FM as a strategic component in service delivery. Some enforcing standards and regulations have to be in place in order to enhance the quality of service delivery of the FM service providers and to improve the FM practices.

- FM organisations must encourage a suitable working culture of positive attitude towards applying performance measurement system and overcome the resistance by applying the required change management approaches

- Moreover, the FM management must ensure a proper training for their employees to ensure a good understanding of the measurement systems applications and benefits.

- The FM service provider shall invest in new technologies and innovative software application to measure performance.

- The development of more explanations on where FM performance measurement leads and how it is useful FM is to the core business, this will be useful for organisations whose core business is not FM so they can see the impact of a high performance FM department (in case FM services are in house) or a high performance outsourced service provider .

- Study the cost impact analysis of performance measurement implementation in the FM organisations. And highlight the value for money generated, this will motivate shareholder to invest to apply such systems.

b. ***Research and Development Studies***

- The developed model adopted the structure of EFQM Excellence Model which is recognized measurement model in academia and general business. This model divided the performance measures into two main perspectives: the drivers and the results. Each has a certain number of criteria .And, each criteria has a number of performance measures. It is recommended that further studies to be conducted to explore the relationship among the performance dimensions of the drivers and results perspectives. And the relationships among the identified performance measures as well.

- It is recommended to conduct case studies verification to improve on the workability of the model and to justify the application on the FM organisations.

- Comparison of the proposed model should be conducted with other Business Excellence Models (BEM) like Baldrige, the Australian Quality Award and Japanese Deming prize etc.

- The measurement process should be identified like RADAR in EFQM; this model discussed the component and structure and did not show how the model will be used.

- The Model should show clearly how the measures can be linked to the overall organisation strategy (vision, Mission…)

9.6 Chapter Summary

As shown in this chapter, in spite of some limitations, the aim and objectives of the dissertation were achieved and the contribution to knowledge in academic and industry perspectives were highlighted, and recommendation for further studies were listed.

As a summary, a comprehensive validated performance measurement model for FM industry was developed. This was achieved by conducting a **literature review** to investigate current issues in performance measurement and management and analyse some of the gaps in knowledge and in the UAE market through **semi structured interviews**; then theoretically develop the PM model that can enhance performance management experience and monitoring within the FM industry by leveraging on the literature review and **case studies findings**; This model was modified based on the facilities management experts' **focus group workshop** conducted, then the **questionnaire survey** was used (quantitative method) to explore the opinion of a wider sector of FM Sector to further confirm and adjust the proposed model, Factor analysis with **SPSS statistical software** were used to help in the data analysis. The last stage was to **evaluate and validate** the model via a questionnaire survey output using confirmatory factor analysis (with the help of **AMOS software**), and **experts feedbacks** through a questionnaire.

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Appendices

Appendix A Interview Protocol Letter

This interview is a part of a PhD study on ***Performance Measurement in facilities management organisations in the United Arab Emirates***.

It is aims to develop a PM model for measuring comprehensively the business performance of the facilities management organisation

The following topics will be explored during our meeting/ interview. They are here below provided for your ready reference:

- Facilities management Performance Models used
- Main Barriers / Challenges in PM implementation
- Implementation Process/ Focus
- Additional performance measures that is crucial to your performance assessment

I will appreciate if you spend around 4**0 minutes** to share your knowledge through an interview.

Your participation and sharing experience and knowledge is highly valued and be assured that precautions have been put in place to protect your privacy and confidentiality.

Thanks in Advance.

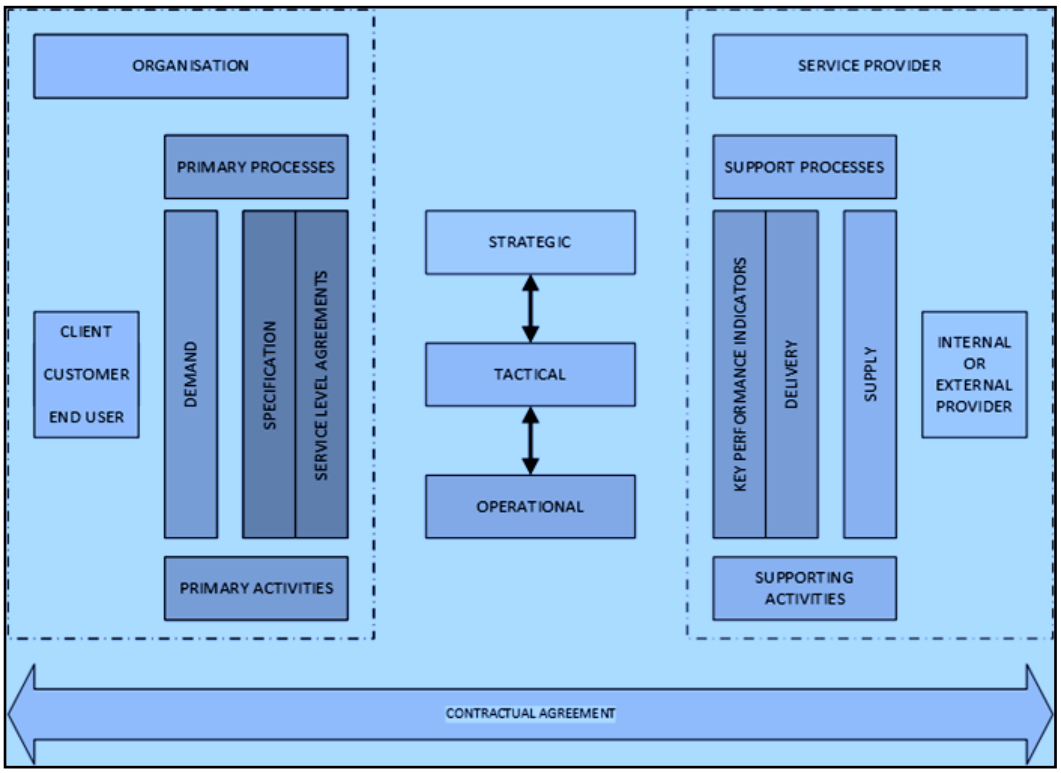
Yours Sincerely,

Appendix B Case Studies Documents

British Standard BS EN 15221-5:2011 -Processes Guidance to FM organisations

The BS EN 15221-5:2011 guide aim is to provide guidance to facilities management (FM) organisations on the development and improvement of their FM processes to support the primary activities of an organisation. Figure 52 suggests that FM organisations need to establish the primary activities and process undertaken by a client organisation from which analysis can be undertaken to provide a clear FM strategy. Continued development of FM services and processes then follows which support the client organisation. All major decisions along the route to final specification of service levels and qualities, choice of delivery model and eventually preparation of the appropriate form of procurement and agreements flow from this basis.

Figure 52 BS EN 155221-5:2011



Source: BIFM, 2011

BHF Auditor's Report

The auditor conducted a maturity assessment analysis of BHF and suggested an action plan of 6 month in order to ensure the readiness of the organisation for the BSC implementation. In this appendix, the auditor's report key points are summarized.

BHF Maturity Assessment

Through analysis of their different attributes (e.g. Governance, Resources, Competencies, Delivery, and Performance), the organisation is being assessed, in early 2015, (see table 91) as immature (very reactive in their day to day operations with no defined goal, strategy or processes). Whilst an organisation with clear objectives, strategy and processes which are continually reviewed and improved is seen as mature.

Table 91 BHF Maturity Scorecard

Maturity Definitions	0	1	2	3	4	5	Remarks
Corporate strategies and objectives have been clearly defined and communicated	0						Not defined
The corporate strategy recognizes facilities management strategy	0						Not clearly defined
Within the Facilities management Strategy:							
Defines and applies methods to assess/measure added value to the organisation	0						Not defined. A mixture of Planned, Condition and Reactive strategies are currently used
Defines the procurement strategy		1					A procurement process was seen during the research period, however without supporting processes this has little impact
Defines the controls for service provision and performance		1					Limited use of Service Levels but these are not monitored or reported
Defines the process for corrective actions when tasks outside the process take place	0						Not defined
Defines the improvement process and the management of change	0						Not defined
Defines a process for the management of risks identified	0						Not defined
Each FM process defines:							
An Objective	0						Not defined
Ownership, Roles and Responsibilities			2				Job Descriptions are available
Stakeholders defined along with their roles and responsibilities	0						Not defined
Audit requirements	0						Not defined
The continued use of each FM process can be observed	0						
Management Information Systems are available		1					There is limited information and what is available is paper based
				TOTAL	**5 / 75**		

The maturity assessment for BHF indicates that the organisation with a 5/75 is in an "***unaware'*** status (table 91) with limited processes and forward planning leaving both the

organisation exposed to potential commercial risks and unknown performance monitoring assessment, and potentially unknown improvement process.

Table 92 summarizes the different maturity levels of organisations and the score level that characterizes the access to the next level.

Table 92 Maturity Levels Definitions

Maturity Definitions **Maturity Level**	**Description**	**Overall Score**
Unaware	Immature organisation with no clear strategy or insufficient processes and resources	0 to 15
Reactive	An element of the organisation is more advanced than other parts. It has an objective and strategy but fails to develop due to other organisational constraints	16 to 30
Defined	A organisation which has defined its objective and basic processes but these are not fully utilized and further development is required	31 to 45
Managed	A mature organisation with clear a vision, strategy, balanced resources and integrated processes but which requires refinement to build capacity to deliver for the long term.	46 to 60
Optimized	A very mature organisation which has a clear vision, strategy and has developed fully integrated processes across the organisation which are monitored and reviewed for continual improvement	60+

Source: Auditors Report

Based on this assessment, the auditor has outlined a detailed action plan (table 93) on two levels: Strategic and tactical level. The auditor reviewed the actions recommended whether they were fully completed or in progress.

BHF put in place a quality management approach in which focus on customer expectations and needs, on employees via leadership involvement and continuous improvement process. BHF has started to nurture a health and safety culture on a strategic level and identified the steps to cascade it down to all its projects.

	Main Observations	Recommended Actions	Actions achieved (6 months later)
Strategic level	• No evidence was found of a sustained Management System	BHF shall adopt a quality management approach based on having the following principles: •Customer Focus, •Leadership purpose and unity, •Involvement of people, •Process approach to activities, •Systems approach to management for interrelated processes, •Continual Improvement, and •Decision making based on factual evidence, •Efficient use of resources;	In progress
	A draft of Vision, Mission, and Objectives exist; however, content is not in line with the BS EN15221 guidelines	•A mission and vision with underpinning values should be set by the wider organisation; •FM team should then look to support these in defining the aspects which affect them, •Develop and set a strategy which fulfils the FM team participation within the mission of the whole organisation.	•Defined an organisational vision that all departments can support •Defined values that reflect the organisation and support meeting the organisations vision •Five objectives were defined in each department as SMART objectives in line with BHF vision
	•No Health and Safety Policy or Management System. •(Under the Abu Dhabi Environment, Health and Safety Management System (ADEHSMS) Regulatory Model Manual (Version 2 February 2012) all entities are required to strive to comply with its requirements (Section 1.7 – Compliance) in having a documented Health and Safety Management system in place. •No person within the management team with an appropriate Health and Safety qualification •The 'Permit to Work' system covers all activities and there is no other specific permit for high risk activities Contractors attending site are not required to provide Risk Assessments or Method Statements to obtain a Permit to Work •There is no use of Risk Assessments and Method Statements by the Maintenance Team •Material Safety Data Sheets are available for some hazardous materials but there is no written document assessing their use in the different work activities •There is no ladder register available as required in the ADEHSMS - Code of Practice number 37	•It is essential that the company takes immediate steps address the need for a Health and Safety Management System (which could be part of a wider Integrated Management System) and address the levels of health and safety standards adopted on site.	•HSE policy issued •HSE Manager recruited •HSE team identified and trained
Tactical (Management)	•Teams in hard services, soft and support services are working in silos •little communication between the different service streams and all appear to report independently to the Operation Director rather than to the Facilities Manager	•Communication channels shall be identified Synergy and integration between departments to be mapped out	•Utilisation of CAFM system •Records are unregistered directly on a central system Work orders are issued on papers but recorded once closed on the system

Table 93 Structural Action Plan

The BSC Implementation Stages

Stage 1- Strategize

When designing a performance management system, the first stage to start with is to create a share understanding about what is to be achieved as well as how it is to be achieved. It is an approach to managing people that increases the probability of achieving success. The BHF organized a set of workshops "Walk the Talk" to engage the key stakeholder's groups in the design of the Balanced Scorecard.

The main aims of these workshops were:

1- To clearly define the goals of the performance system by engaging the employees who must understand the value of the system– how it will help in understanding the performance requirements of their jobs, and how it will support their growth and development.

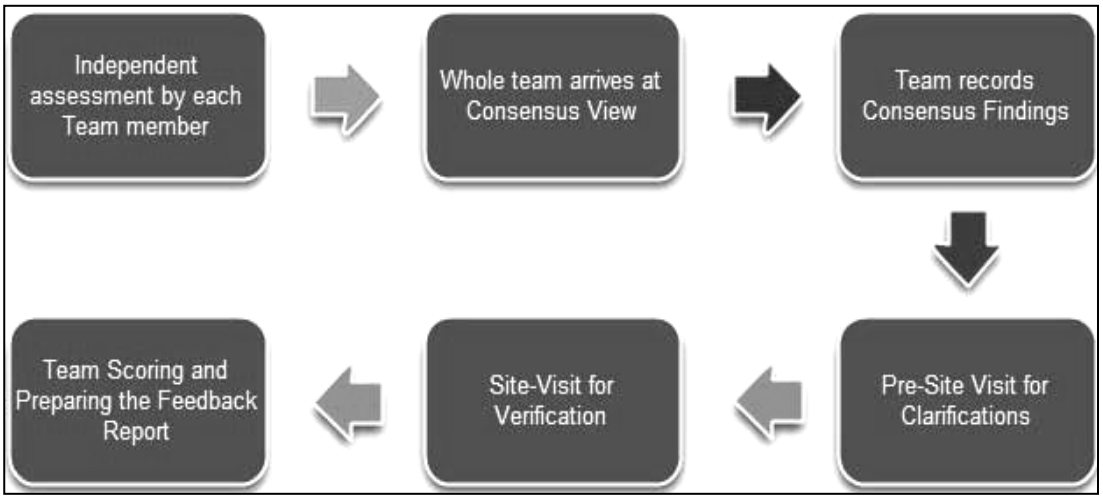
2- Define the guiding principles for the design of the performance management system (align staff goals with the goals of the organisation, encourage regular two-way feedback, address both the "what" and "how" of performance, impact performance positively and support development for current and future roles, recognize accomplishments and the right behaviours

During the design stage, the senior management of BHF admitted the BSC shall take into consideration the following FM particularities into account and distinguish between the different types of jobs or tasks:

Excellent Assessment Feedback Report (EFQM-Based Award)

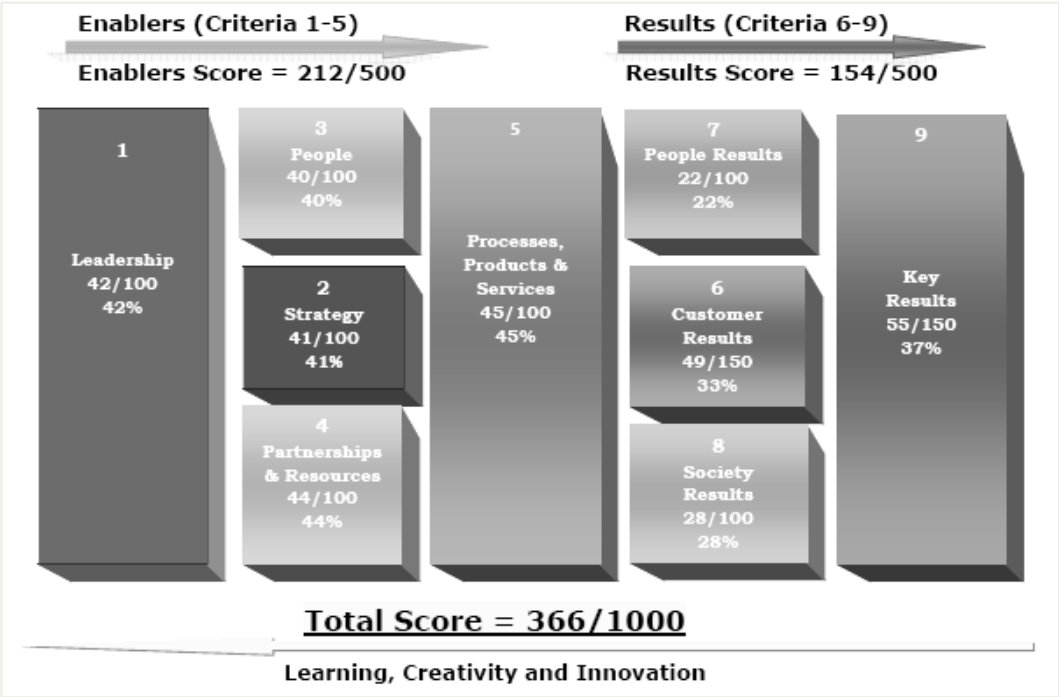
Figure 53 below shows the EFQM based assessment process which starts assessment team members introduction, interviews, site visits conducted, meetings, scoring and a feedback report preparations.

Figure 53 Overview of the assessment process



Below is the scoring which shows that strategy (41/100); people (22/100), leadership (42/100), etc…

Figure 54 Scoring as per DQA assessment - 2010



Criterion	Actions needed as per the EFQM Assessment	Action Plan Taken as per the EFQM assessment
1- Leadership	6- Their leaders shall measure the effectiveness of their approach in developing vision, mission and values. 7- IDA leaders have to understand and develop the underlying capabilities of the organisation. 8- Leaders shall have a systematic and integrated approach to promote equal opportunity and diversity 9- Leaders shall be flexible: review, adapt and realign the direction of the organisation when necessary, inspiring trust at all times. 10- IDA shall apply an integrated approach to maintain sustainable advantage by learning and adopting new ways of working.	Evidence available: Management Review Meetings, Departmental staff meetings and Leadership training programs. Various awards and recognitions… Further, the feedback obtained for the questions in the Leadership section of the annual Employee survey give direct evidence of management participation in Organisational Development Performance Planning has been in place. And has been deployed in 2013 from CEO up to Supervisor levels The 5-year strategy plan (2013 to 2017) was developed in Q4 – 2012 to leverage / extend the organisational capabilities and address the areas of improvement with market requirements / competition context.
2- Strategy	CAPEX are evaluated only on the basis of financial techniques, consideration of external factors such as economical, market, political, legal and regulatory compliance is not evident. Lack of evidence of understanding and anticipating the long and short term impact of changes to relevant political, legal, regulatory and compliance requirements. No evidence of clear strategy on mission like providing cost effective	Revised CAPEX evaluation process for all expenses > AED 0.5 M Investor Audit reports, Management review meetings, Quarterly BP review Supplier Selection process in Procurement and engagement "periodic evaluation", IT, HR, Operations, EHSQ, annual vendor evaluation, etc.. Internal Benchmark establishment incorporated as KPI in BSC for 2013 Sustainability and CSR goals in BSC
3- People	1- A formal succession planning does not exist. 2- Though the company has implemented an Employee Satisfaction Survey, no examples were given that support people involvement in strategy review. 3- No formal targets are established for Emiratization, despite that Emiratis are given preference during the recruitment process. 4- Though performance appraisal, open door policy and training effectiveness evaluation was not carried out before 2010. 5- No evidence of an integrated approach of how they encourage their people to be more involved in the creation of the organisation's ongoing success. 6- No evidence of a structured approach to ensure handling and embracing the diversity of their people.	Succession Planning defined from 2013 upwards Cultural mix of employees is a direct result of equal opportunity and diversity. Interviews are being conducted in different countries to maintain the diversity as much as possible. Organisation charts and HR statistics are also evidences SWOT Analysis with manager and above level taken to review strategy and identify actionable improvement items System in place by way of Org. Charts, SRFs, People Manual, Capability Development and Performance Management System
4-Partnership and Resources	No evidence of how the company is keeping a sustainable relationship with all partners. No evidence of an integrated approach of working together with partners to achieve mutual benefit, supporting one another with expertise; resources and knowledge to achieve shared goals like to reduce inventories.	MOU signed with strategic partners, suppliers and subcontractors.
5-Processes	No structured approach of how IDA uses data and information on the current performance and capabilities of processes to identify opportunities for, and generate, innovation.	Business Process Manual Management Review

Table 94 DQA Assessment Key Points from Feedback Report Summary

Appendix C The EFQM Criteria details

	EFQM	
	Criteria	CSF/Measure
Enablers/ Drivers	Leadership	1a. Leaders develop the mission, vision, values and ethics and act as role models.
		1b. Leaders define, monitor, review and drive the improvement of the organisation's management system and performance.
		1c. Leaders engage with external stakeholders.
		1d. Leaders reinforce a culture of excellence with the organisation's people.
		1e. Leaders ensure that the organisation is flexible and manages change effectively.
	Strategy	2a. Strategy is based on understanding the needs and expectations of both stakeholders and the external environment.
		2b. Strategy is based on understanding internal performance and capabilities.
		2c. Strategy and supporting policies are developed, reviewed and updated.
		2d. Strategy and supporting policies are communicated, implemented and monitored.
	People	3a. People plans support the organisation's strategy.
		3b. People's knowledge and capabilities are developed.
		3c. People are aligned, involved and empowered.
		3d. People communicate effectively throughout the organisation.
		3e. People are rewarded, recognised and cared for.
	Partnership and Resources	4a. Partners and suppliers are managed for sustainable benefit.
		4b. Finances are managed to secure sustained success.
		4c. Buildings, equipment, materials and natural resources are managed in a sustainable way.
		4d. Technology is managed to support the delivery of strategy.
		4e. Information and knowledge are managed to support effective decision making and to build the organisation's capability.
	Process, Product and Services	5a. Process are designed and managed to optimise stakeholder value.
		5b. Products and services are developed to create optimum value for customers.
		5c. Products and services are effectively promoted and marketed.
		5d. Products and services are produced, delivered and managed.
		5e. Customer relationships are managed and enhanced.
Results	Customer Results	6a. Perceptions.
		6b. Performance Indicators.
	People results	7a. Perceptions.
		7b. Performance Indicators.
	Society Results	8a. Perceptions.
		8b. Performance Indicators.
	Business Results	9a. Business Outcomes.
		9b. Business Performance Indicators.

Appendix D Questionnaire Survey

This research is being conducted as part of a PhD programme at Heriot Watt University .It aims to develop a comprehensive Performance Measurement model for facilities management organisations. Part of the research is gather the opinions of FM professionals about performance measures suggested in this study .The questionnaire was made of three sections

- **The first section** consists of general questions with regards to the profile of the participant.
- **The second section** assesses the level to which each proposed performance measure can be used in the facilities management industry to measure the performance of the organisation.
- **The third section** includes an open question for any further comments and recommendations

Section One: Background Information

Please state your job title:	**Facilities Engineer**	**Facilities Manager**	**Mid Management**	**Senior Management**

Years of Experience	1 to 3 years	3 to 7 years	7 to 10 years	More than 10 years

How long have you been in the organisation	Less than a year	1 to 5 years	More than 5 years	Less than a year

How long have you been in the organisation	Less than a year	1 to 5 years	More than 5 years

What is the size of your company (employees number):	0-50	50-500	above 500

Age of organisation	1 to 3 years	3 to 7 years	7 to 10 years	More than 10 years

Section Two: Rating "performance measures"

Please indicate to what extent you agree (form 1 to 10) that each of the performance measures listed below can be used to measure FM organisation performance (1: Strongly disagree, 10: Strongly agree)

Code	Performance Measure	Ratings									
E1	Leaders develop the mission, vision and values	1	2	3	4	5	6	7	8	9	10
E2	Effective implementation of changes	1	2	3	4	5	6	7	8	9	10
E3	Leaders Performance Management	1	2	3	4	5	6	7	8	9	10
E4	Leaders engage with external stakeholders.	1	2	3	4	5	6	7	8	9	10
E5	Excellence Culture Reinforcement by Leaders	1	2	3	4	5	6	7	8	9	10
E6	Adherence to policies	1	2	3	4	5	6	7	8	9	10
E7	Appropriateness of policies	1	2	3	4	5	6	7	8	9	10
E8	Strategy is based on understanding the stakeholders needs	1	2	3	4	5	6	7	8	9	10
E9	Strategy is developed, reviewed and updated.	1	2	3	4	5	6	7	8	9	10
E10	Strategy is communicated, implemented and monitored.	1	2	3	4	5	6	7	8	9	10
E11	Policies Necessary revised on a regular basis	1	2	3	4	5	6	7	8	9	10
E12	Inventory performance	1	2	3	4	5	6	7	8	9	10
E13	Risk Management	1	2	3	4	5	6	7	8	9	10
E14	Standards Necessary revised on a regular basis	1	2	3	4	5	6	7	8	9	10
E15	Effective Internal communication	1	2	3	4	5	6	7	8	9	10
E16	Appropriateness and suitability of standards	1	2	3	4	5	6	7	8	9	10
E17	Mobilization	1	2	3	4	5	6	7	8	9	10
E18	Assets maintenance Management	1	2	3	4	5	6	7	8	9	10
E19	Resource utilisation	1	2	3	4	5	6	7	8	9	10
E20	Service reliability	1	2	3	4	5	6	7	8	9	10
E21	Service Delivery Performance	1	2	3	4	5	6	7	8	9	10
E22	Achievement of completion deadlines	1	2	3	4	5	6	7	8	9	10
E23	Help Desk/Call centre Performance	1	2	3	4	5	6	7	8	9	10
E24	Workforce and Teamwork Management	1	2	3	4	5	6	7	8	9	10
E25	Planning and Scheduling	1	2	3	4	5	6	7	8	9	10
E26	Roles and responsibilities are clearly defined	1	2	3	4	5	6	7	8	9	10
E27	Employees Recognition	1	2	3	4	5	6	7	8	9	10
E28	Team satisfaction	1	2	3	4	5	6	7	8	9	10
E29	Staff commitment	1	2	3	4	5	6	7	8	9	10
E30	Facilities management culture	1	2	3	4	5	6	7	8	9	10
E31	Competence of staff	1	2	3	4	5	6	7	8	9	10
E32	Staff training and development	1	2	3	4	5	6	7	8	9	10
E33	New Service introduction	1	2	3	4	5	6	7	8	9	10
E34	Business Continuity	1	2	3	4	5	6	7	8	9	10
E35	Marketing Management	1	2	3	4	5	6	7	8	9	10
E36	Innovation	1	2	3	4	5	6	7	8	9	10
E37	Benchmarking	1	2	3	4	5	6	7	8	9	10
E38	Appropriateness and suitability of service levels	1	2	3	4	5	6	7	8	9	10
E39	Customer relationships Management	1	2	3	4	5	6	7	8	9	10
E40	Contract management	1	2	3	4	5	6	7	8	9	10
E41	Client-service provider relationship	1	2	3	4	5	6	7	8	9	10
E42	Supply chain management	1	2	3	4	5	6	7	8	9	10
E43	Indoor Environment Quality	1	2	3	4	5	6	7	8	9	10
E44	Statuary Compliance	1	2	3	4	5	6	7	8	9	10
E45	Periodic HandS audit	1	2	3	4	5	6	7	8	9	10
E46	Environmental Sustainability Management	1	2	3	4	5	6	7	8	9	10
E47	Waste management	1	2	3	4	5	6	7	8	9	10
E48	Health and Safety	1	2	3	4	5	6	7	8	9	10
E49	Technology Management	1	2	3	4	5	6	7	8	9	10
E50	Information and Knowledge Management	1	2	3	4	5	6	7	8	9	10
E51	CAFM usage	1	2	3	4	5	6	7	8	9	10

Code	Performance Measure	Ratings									
R1	Society Results Performance Indicators.	1	2	3	4	5	6	7	8	9	10
R2	External Awards	1	2	3	4	5	6	7	8	9	10
R3	Value for money	1	2	3	4	5	6	7	8	9	10
R4	Turnover rate	1	2	3	4	5	6	7	8	9	10
R5	Market share	1	2	3	4	5	6	7	8	9	10
R6	Profitability	1	2	3	4	5	6	7	8	9	10
R7	Cash flow	1	2	3	4	5	6	7	8	9	10
R8	Revenue growth	1	2	3	4	5	6	7	8	9	10
R9	Customer Results Performance Indicators.	1	2	3	4	5	6	7	8	9	10
R10	Corporate Social Responsibility	1	2	3	4	5	6	7	8	9	10
R11	Reoccurring business	1	2	3	4	5	6	7	8	9	10

Section Three – Further comments and recommendations

Appendix E AMOS output

Estimates (Initial Model)

Regression Weights

			Estimate	S.E.	C.R.	P	Label
E12	<---	F1	.938	.084	11.130	***	
E13	<---	F1	.908	.055	16.643	***	
E14	<---	F1	.688	.053	12.980	***	
E15	<---	F1	.760	.043	17.779	***	
E16	<---	F1	1.000				
E17	<---	F1	.742	.045	16.659	***	
E26	<---	F3	.598	.059	10.165	***	
E27	<---	F3	.915	.050	18.226	***	
E28	<---	F3	1.000				
E29	<---	F3	.436	.078	5.600	***	
E30	<---	F3	.999	.006	155.212	***	
E31	<---	F3	.640	.080	8.009	***	
E6	<---	F4	.761	.081	9.458	***	
E7	<---	F4	.797	.088	9.012	***	
E8	<---	F4	1.000				
E9	<---	F4	.866	.055	15.867	***	
E10	<---	F4	.997	.010	99.215	***	
E11	<---	F4	.533	.060	8.892	***	
E37	<---	F5	.704	.056	12.644	***	
E36	<---	F5	.634	.061	10.414	***	
E35	<---	F5	.934	.032	29.505	***	
E34	<---	F5	.431	.061	7.035	***	
E33	<---	F5	1.000				
E32	<---	F5	.654	.054	12.047	***	
E18	<---	F1	.862	.033	26.520	***	
E19	<---	F2	.992	.016	61.432	***	
E20	<---	F2	.475	.065	7.288	***	
E22	<---	F2	.475	.062	7.667	***	
E23	<---	F2	.958	.022	43.426	***	
E24	<---	F2	.330	.065	5.095	***	
E1	<---	F6	1.000				
E2	<---	F6	.983	.042	23.657	***	
E3	<---	F6	.710	.050	14.140	***	
E4	<---	F6	1.008	.037	26.884	***	
E5	<---	F6	.709	.050	14.162	***	
E39	<---	F7	1.000				
E40	<---	F7	1.116	.049	22.582	***	
E41	<---	F7	.889	.049	18.170	***	
E42	<---	F7	.751	.056	13.470	***	
E49	<---	F8	1.000				
E50	<---	F8	.879	.032	27.693	***	

			Estimate	S.E.	C.R.	P	Label
E51	<---	F8	.943	.027	35.189	***	
E43	<---	F9	.730	.092	7.912	***	
E44	<---	F9	.635	.086	7.356	***	
E45	<---	F9	.727	.088	8.247	***	
E46	<---	F9	.811	.091	8.916	***	
E47	<---	F9	.766	.098	7.806	***	
E48	<---	F9	1.000				
E21	<---	F2	1.000				
R3	<---	F10	.737	.084	8.749	***	
R4	<---	F10	.769	.085	9.006	***	
R5	<---	F10	.967	.086	11.291	***	
R6	<---	F10	1.000				
R7	<---	F10	.884	.079	11.174	***	
R8	<---	F10	.636	.078	8.142	***	
R9	<---	F11	1.000				
R10	<---	F11	.969	.041	23.492	***	
R11	<---	F11	1.003	.036	27.495	***	
R1	<---	F12	1.000				
R2	<---	F12	1.000				
E25	<---	F2	.524	.061	8.638	***	
E38	<---	F7	.655	.069	9.462	***	

Variances

	Estimate	S.E.	C.R.	P	Label
F1	4.976	.526	9.465	***	
F3	8.487	.842	10.074	***	
F4	2.995	.298	10.051	***	
F5	1.139	.117	9.727	***	
F2	1.223	.126	9.693	***	
F6	3.359	.366	9.182	***	
F7	3.269	.415	7.880	***	
F8	1.012	.101	10.017	***	
F9	.921	.163	5.667	***	
F10	.777	.118	6.578	***	
F11	3.422	.368	9.304	***	
F12	3.277	.352	9.312	***	
x1	6.627	.672	9.860	***	
x2	2.595	.273	9.506	***	
x3	2.568	.263	9.764	***	
x4	1.565	.166	9.402	***	
x5	.294	.076	3.862	***	
x6	1.727	.182	9.504	***	
x8	.011	.005	2.172	.030	
x9	1.043	.103	10.082	***	
x10	.941	.093	10.080	***	
x12	.073	.009	8.496	***	

	Estimate	S.E.	C.R.	P	Label
x13	1.031	.102	10.091	***	
x15	5.972	.592	10.093	***	
x16	4.335	.430	10.075	***	
x17	.017	.029	.574	.566	
x18	10.499	1.040	10.097	***	
x19	.035	.029	1.221	.222	
x21	3.939	.390	10.087	***	
x22	4.750	.471	10.088	***	
x23	.010	.016	.612	.541	
x24	1.801	.179	10.060	***	
x25	.034	.016	2.072	.038	
x26	2.186	.217	10.089	***	
x27	.668	.068	9.885	***	
x28	.815	.082	9.970	***	
x29	.146	.023	6.275	***	
x30	.842	.084	10.048	***	
x31	.025	.021	1.208	.227	
x32	.638	.064	9.911	***	
x33	1.461	.152	9.602	***	
x34	.520	.075	6.952	***	
x35	1.472	.153	9.604	***	
x36	.768	.094	8.174	***	
x37	.312	.060	5.194	***	
x38	1.442	.150	9.625	***	
x39	.754	.089	8.470	***	
x40	.170	.073	2.340	.019	
x41	.991	.116	8.552	***	
x42	2.666	.269	9.923	***	
x43	.734	.101	7.294	***	
x44	.919	.104	8.797	***	
x45	.617	.078	7.905	***	
x46	.682	.080	8.515	***	
x47	.762	.084	9.025	***	
x48	.796	.091	8.735	***	
x14	.897	.089	10.074	***	
x7	.725	.092	7.874	***	
x50	.120	.016	7.357	***	
x51	.183	.021	8.909	***	
x49	.000	.013	.032	.975	
x11	.051	.007	7.169	***	
x143	.628	.067	9.314	***	
x144	.435	.055	7.864	***	
x145	.414	.058	7.082	***	
x146	.497	.064	7.756	***	
x147	.693	.076	9.054	***	

	Estimate	S.E.	C.R.	P	Label
x148	.693	.076	9.139	***	
x150	.491	.078	6.287	***	
x151	.804	.098	8.208	***	
x149	.250	.066	3.804	***	
x250	.497	.145	3.431	***	
x251	.572	.148	3.876	***	
x20	11.028	1.092	10.095	***	

Estimates (Re-specified model)

Regression Weights

			Estimate	S.E.	C.R.	P	Label
E12	<---	F1	.902	.083	10.851	***	
E13	<---	F1	.869	.055	15.906	***	
E14	<---	F1	.681	.051	13.322	***	
E15	<---	F1	.716	.044	16.342	***	
E16	<---	F1	1.000				
E17	<---	F1	.714	.044	16.133	***	
E26	<---	F3	.597	.059	10.136	***	
E27	<---	F3	.914	.050	18.108	***	
E28	<---	F3	1.000				
E29	<---	F3	.435	.077	5.621	***	
E30	<---	F3	.999	.007	149.785	***	
E31	<---	F3	.639	.080	7.990	***	
E6	<---	F4	.758	.081	9.417	***	
E7	<---	F4	.793	.088	8.971	***	
E8	<---	F4	1.000				
E9	<---	F4	.864	.055	15.792	***	
E10	<---	F4	.995	.010	96.240	***	
E11	<---	F4	.530	.060	8.838	***	
E37	<---	F5	.704	.056	12.644	***	
E36	<---	F5	.634	.061	10.414	***	
E35	<---	F5	.934	.032	29.505	***	
E34	<---	F5	.431	.061	7.035	***	
E33	<---	F5	1.000				
E32	<---	F5	.654	.054	12.047	***	
E18	<---	F1	.846	.031	27.215	***	
E19	<---	F2	.994	.016	61.413	***	
E20	<---	F2	.473	.065	7.234	***	
E22	<---	F2	.473	.057	8.277	***	
E23	<---	F2	.958	.022	43.111	***	
E24	<---	F2	.327	.065	5.044	***	
E1	<---	F6	1.000				
E2	<---	F6	.972	.041	23.906	***	
E3	<---	F6	.670	.052	13.009	***	
E4	<---	F6	1.003	.036	27.880	***	
E5	<---	F6	.669	.051	13.029	***	
E39	<---	F7	1.000				
E40	<---	F7	.869	.041	21.138	***	
E41	<---	F7	.646	.046	14.027	***	

			Estimate	S.E.	C.R.	P	Label
E42	<---	F7	.783	.034	22.810	***	
E49	<---	F8	1.000				
E50	<---	F8	.879	.032	27.693	***	
E51	<---	F8	.943	.027	35.189	***	
E43	<---	F9	.730	.092	7.912	***	
E44	<---	F9	.635	.086	7.356	***	
E45	<---	F9	.727	.088	8.247	***	
E46	<---	F9	.811	.091	8.916	***	
E47	<---	F9	.766	.098	7.806	***	
E48	<---	F9	1.000				
E21	<---	F2	1.000				
R3	<---	F10	.737	.084	8.749	***	
R4	<---	F10	.769	.085	9.006	***	
R5	<---	F10	.967	.086	11.291	***	
R6	<---	F10	1.000				
R7	<---	F10	.884	.079	11.174	***	
R8	<---	F10	.636	.078	8.142	***	
R9	<---	F11	1.000				
R10	<---	F11	.969	.041	23.492	***	
R11	<---	F11	1.003	.036	27.495	***	
R1	<---	F12	1.000				
R2	<---	F12	1.000				
E25	<---	F2	.522	.061	8.589	***	
E38	<---	F7	.434	.063	6.853	***	

Covariances

			Estimate	S.E.	C.R.	P	Label
x16	<-->	x18	.161	.203	.796	.426	
x21	<-->	x22	3.347	.384	8.718	***	
x33	<-->	x35	1.516	.162	9.359	***	
x24	<-->	x26	1.649	.181	9.088	***	
x9	<-->	x10	.175	.058	3.047	.002	
x10	<-->	x13	.332	.064	5.214	***	
x10	<-->	x14	.261	.057	4.568	***	
x4	<-->	x6	.994	.154	6.465	***	
x2	<-->	x3	1.060	.210	5.041	***	
x15	<-->	x16	3.715	.443	8.377	***	
x39	<-->	x40	.946	.126	7.498	***	
x18	<-->	x20	8.369	.951	8.801	***	

Variances:

	Estimate	S.E.	C.R.	P	Label
F1	5.137	.528	9.730	***	
F3	8.485	.843	10.071	***	
F4	3.001	.298	10.065	***	
F5	1.139	.117	9.727	***	
F2	1.222	.126	9.682	***	
F6	3.414	.367	9.312	***	
F7	4.176	.431	9.683	***	
F8	1.012	.101	10.017	***	
F9	.921	.163	5.667	***	
F10	.777	.118	6.578	***	
F11	3.422	.368	9.304	***	
F12	3.277	.352	9.312	***	
x1	6.831	.687	9.949	***	

	Estimate	S.E.	C.R.	P	Label
x2	2.819	.291	9.698	***	
x3	2.536	.258	9.845	***	
x4	1.806	.187	9.665	***	
x5	.133	.082	1.619	.105	
x6	1.845	.191	9.680	***	
x8	.009	.005	1.854	.064	
x9	1.047	.104	10.084	***	
x10	.796	.077	10.302	***	
x12	.074	.009	8.512	***	
x13	1.034	.102	10.092	***	
x15	5.983	.593	10.092	***	
x16	4.384	.435	10.083	***	
x17	.018	.033	.553	.580	
x18	10.366	1.026	10.105	***	
x19	.034	.033	1.034	.301	
x21	3.950	.391	10.091	***	
x22	4.764	.472	10.092	***	
x23	.005	.018	.261	.794	
x24	1.811	.180	10.065	***	
x25	.039	.018	2.132	.033	
x26	2.194	.217	10.092	***	
x27	.668	.068	9.885	***	
x28	.815	.082	9.970	***	
x29	.146	.023	6.275	***	
x30	.842	.084	10.048	***	
x31	.025	.021	1.208	.227	
x32	.638	.064	9.911	***	
x33	1.620	.167	9.714	***	
x34	.497	.074	6.671	***	
x35	1.631	.168	9.715	***	
x36	.786	.095	8.260	***	
x37	.257	.060	4.257	***	
x38	.721	.091	7.959	***	
x39	1.597	.165	9.702	***	
x40	1.092	.128	8.516	***	
x41	.084	.091	.925	.355	
x42	3.281	.326	10.048	***	
x43	.734	.101	7.294	***	
x44	.919	.104	8.797	***	
x45	.617	.078	7.905	***	
x46	.682	.080	8.515	***	
x47	.762	.084	9.025	***	
x48	.796	.091	8.735	***	
x14	.900	.089	10.077	***	
x7	.743	.095	7.816	***	
x50	.120	.016	7.357	***	
x51	.183	.021	8.909	***	
x49	.000	.013	.032	.975	
x11	.053	.007	7.266	***	
x143	.628	.067	9.314	***	
x144	.435	.055	7.864	***	
x145	.414	.058	7.082	***	
x146	.497	.064	7.756	***	

	Estimate	S.E.	C.R.	P	Label
x147	.693	.076	9.054	***	
x148	.693	.076	9.139	***	
x150	.491	.078	6.287	***	
x151	.804	.098	8.208	***	
x149	.250	.066	3.804	***	
x250	.497	.145	3.431	***	
x251	.572	.148	3.875	***	
x20	11.040	1.094	10.095	***	

Appendix F FM Experts Validating Questionnaire

			Ratings
A-	**Overall Model**		
1	Comprehensiveness	Does the model cover all the performance criteria?	1 2 3 4 5 6 7 8 9 10
2	Adaptable	Can the performance measurement model be adaptable according to strategy?	1 2 3 4 5 6 7 8 9 10
3	Benchmarking capability	Can the model be used for internal and external benchmarking?	1 2 3 4 5 6 7 8 9 10
4	Usefulness of the model	Do you consider the model as useful tool to measure performance?	1 2 3 4 5 6 7 8 9 10
5	Focused on improvement	Does the model focus on organisation improvement?	1 2 3 4 5 6 7 8 9 10
B-	**Performance Measures**		
1	Linked to strategy	Do the measures reflect the strategy of the FM Organisation?	1 2 3 4 5 6 7 8 9 10
2	Clear	Are the measures are clear?	1 2 3 4 5 6 7 8 9 10
3	Effective – useful	Do the performance measures offer the useful info?	1 2 5 6 7 8 10
4	Relevant	Are the measures relevant to the FM industry?	1 2 3 4 5 6 7 8 9 10
C-	**Model Structure**		
1	Balanced	Is it balanced /financial and non-financial measurement	1 2 3 4 5 6 7 8 9 10
2	Logical structure	Is the structure logical?	1 2 3 4 5 6 7 8 9 10
3	Clarity of the model	Is it Clear?	1 2 3 4 5 6 7 8 9 10
4	Comprehensibility	Is the model simple and understandable to the intended users?	1 2 3 4 5 6 7 8 9 10
5	Weightage	Do the measures have the right Weightage?	1 2 3 4 5 6 7 8 9 10